UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,393,034 B2
APPLICATION NO. : 15/285215
DATED : August 27, 2019
INVENTOR(S) : Collie et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 13, Line 47 (Claim 2), delete "claim **1**; and" and substitute therefore -- claim **1** --; and

Column 13, Line 52 (Claim 2), delete "cutoff solenoid couples" and substitute therefore -- cutoff couples --.

Signed and Sealed this
Seventh Day of January, 2020



Andrei Iancu
Director of the United States Patent and Trademark Office

Patent
Attorney Docket No.: CET1090.044

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Number	:	10, 393,034 B2
Issued	:	August 27, 2019
Name of Patentee	:	Collie et al.
Title of Invention	:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR OFFICE'S MISTAKE (37 CFR 1.322)

1. It is noted that errors appear in this patent of a clerical nature or characterized as more fully described below and would not constitute new matter or would not require re-examination. A Certificate of Correction is requested.

2. Attached hereto is Form PTO-1050 which should be suitable for printing.

3. The errors to be corrected are as follows:

In the Claims

Col. 13, line 47 (Claim 2), delete "claim **1**; and" and
substitute therefore -- claim **1** --; and

Col. 13, line 52 (Claim 2), delete "cutoff solenoid couples" and
substitute therefore -- cutoff couples --.

4. Please send the Certificate to:

Timothy J. Ziolkowski
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074

Date: 12/10/19

Timothy J. Ziolkowski
Registration No. 38,368
Telephone: (262) 268-8100

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 10,393,034 B2

APPLICATION NO. : 15/285,215

ISSUE DATE : August 27, 2019

INVENTOR(S) : Collie et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Col. 13, line 47 (Claim 2), delete "claim 1; and" and
substitute therefore -- claim 1 --; and

Col. 13, line 52 (Claim 2), delete "cutoff solenoid couples" and
substitute therefore -- cutoff couples --.

(Also Form PTO-1050)

MAILING ADDRESS OF SENDER:

Timothy J. Ziolkowski
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074

PATENT NO: 10,393,034 B2

Burden Hour Statement: This form is estimated to take 1.0 hour to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Electronic Acknowledgement Receipt

EFS ID:	37986538
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:	10-DEC-2019
Filing Date:	04-OCT-2016
Time Stamp:	15:41:03
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	Request for Certificate of Correction	ReqForCOC.pdf	2424400 e39b05368e2c3833ad8f9585a5016c423b5d27b8	no	2

Warnings:

Champion - EX2092, Page 4 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Information:	
Total Files Size (in bytes):	2424400

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/285,215	08/27/2019	10393034	CET1090.044	2429

26629 7590 08/07/2019

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

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 30 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

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

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 USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

OPAP AKIMA-15 JUL 0 9 2019 PATENT & TRADEMARK OFFICE

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	:	10/4/2016
For	:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
Group Art No.	:	2831
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:

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) □ with sufficient postage as first class mail

37 CFR 1.10 □ As "Express Mail Post Office to Addressee" Mailing Label No.

Transmission

■ transmitted by facsimile to Fax No.: 571-273-8300 addressed to Examiner Long T. Tran at the Patent and Trademark Office.

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

Date: 7/9/19

Robyn L. Templin
Signature

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

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Dear Sir:

Responsive to the Notice of Allowability mailed June 18, 2019, Applicant submits the following remarks responsive to the Examiner's Statement of Reasons for Allowance.

Champion - EX2092, Page 7 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

REMARKS

In response to the Examiner's Reasons for Allowance, Applicant believes that a separate Statement of Reasons for Allowance is unnecessary in the present case as the file history sufficiently sets forth the patentable distinctions of claims 1-7 and 13-29.

The patentability of claims 1-7 and 13-29 lies in each claim as a whole. That is, a single particular element or feature of a claim does not define the claim's patentability, but rather, it is the combination of elements and the interconnection therebetween that define the invention. The claims cannot be considered to be limited in scope based on this brief statement by the Examiner. Applicant stands by its position previously set forth in the file history.

Applicant does not acquiesce to the accuracy of the Examiner's statements in the Reasons for Allowance nor the Examiner's partial paraphrasing of the claim elements.

Entry of these remarks is appreciated and Applicant cordially invites the Examiner to respond, should the Examiner disagree.

Respectfully submitted,

Timothy J. Ziolkowski
Registration No. 38,368
Direct Dial 262-268-8181
tjz@zpspatents.com

Dated: 7/9/19
Attorney Docket No.: CET1090.044

P.O. ADDRESS:
Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074
262-268-8100

PAGE 4/4 * RCVD AT 7/9/2019 3:18:45 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/6 * DNIS:2732885 * CSID:2622688185 * ANI:2622688185 * DURATION (mm-ss):01-29

Best Available Copy

OPAP AKIMA-15 JUL 0 9. 2019 PATENT & TRADEMARK OFFICE

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

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

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26629 7390 06/18/2019
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

OPAP AKIMA-15 JUL 0 9 2019 PATENT & TRADEMARK OFFICE

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Robyn L. Templin	(Typed or printed name)
Robyn L. Templin	(Signature)
7/9/19	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044	2429

TITLE OF INVENTION: FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	09/18/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
TRAN, LONG T	3747	123-575000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Ziolkowski Patent Solutions Group, SC
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Champion Power Equipment, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Santa Fe Springs, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☒ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date 7/9/19

Typed or printed name Timothy J. Ziolkowski Registration No. 38,368

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
PAGE 1/4 * RCVD AT 7/9/2019 3:18:45 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/6 * DNIS:2732885 * CSID:2622688185 * ANI:2622688185 * DURATION (mm-ss):01-29
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

United States Patent and Trademark Office

- Sales Receipt -

07/10/2019 HVUONG2 00000007 15285215

01 FC:2501 500.00 OP

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

26629 7590 06/18/2019

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

EXAMINER
TRAN, LONG T

ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 06/18/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044	2429

TITLE OF INVENTION: FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	09/18/2019

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

Champion - EX2092, Page 11 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26629 7590 06/18/2019

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

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044	2429

TITLE OF INVENTION: FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

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EXAMINER	ART UNIT	CLASS-SUBCLASS
TRAN, LONG T	3747	123-575000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

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(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Champion - EX2092, Page 12 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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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 06/18/2019

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

EXAMINER	
TRAN, LONG T	

ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 06/18/2019

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Champion - EX2092, Page 13 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 30 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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 disclosure of these records is required by the Freedom of Information Act.
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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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 inspection 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.

Notice of Allowability	Application No. 15/285,215	Applicant(s) Collie et al.	
	Examiner LONG T TRAN	Art Unit 3747	AIA (FITF) Status Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 25 April 2019.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ 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.

3. ☑ The allowed claim(s) is/are 1-7 and 13-29 . As a result of the allowed claim(s), 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.**

4. ☐ 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)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/LONG T TRAN/
Primary Examiner, Art Unit 3747

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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. The Amendment filed April 25, 2019 has been entered. No new matter has been added.

Allowable Subject Matter

3. Claims 1- 7, 13 – 29 are allowed.

4. The following is an examiner's statement of reasons for allowance: The Amendment overcomes the prior art rejection because neither Poelhman nor Walker teaches a liquid cutoff solenoid coupled to the carburetor downstream from the float bowl, as well as a switch to selectively couple a power source to the liquid cutoff solenoid to open and close the liquid fuel path. No other reference teaches this structure. Therefore, the multi-fuel engine with a carburetor as claimed is considered a novel approach to utilizing two or more fuels via a selective switch and liquid cutoff solenoid valve.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

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

6. 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 Mon - Fri 9:00 - 5:00.

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.

/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-20150122230-A1	05-2015	Sarder; Mark J.	F02D19/0647	123/525
*	B	US-20140373531-A1	12-2014	Wong; Jim	F02B43/02	60/605.1
*	C	US-20140238340-A1	08-2014	Dunn; Mark E.	F02M43/00	123/299
*	D	US-20070137591-A1	06-2007	Sugimoto; Yasuhiro	F02B43/00	123/41.7
*	E	US-20040139943-A1	07-2004	Kern, Robert D.	F01P11/16	123/198D
*	F	US-6591817-B2	07-2003	Deutsch; Robert W.	F02D19/0647	123/525
*	G	US-20020134362-A1	09-2002	Deutsch, Robert W.	F02D19/0647	123/575
*	H	US-5611312-A	03-1997	Swanson; Mark S.	F02M1/02	123/179.18
*	I	US-5450832-A	09-1995	Graf; Bruce R.	F02M13/08	123/515
*	J	US-4489699-A	12-1984	Poehlman; Arthur G.	F02B69/04	123/525
*	K	US-3783849-A	01-1974	Bramfitt; Thomas Hugh	F02M13/06	123/179.16
*	L	US-3718000-A	02-1973	Walker; Brooks	F02B11/02	123/525
	M					

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.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	**Art Unit**
	LONG T TRAN	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
Updated text search	6/3/2018	LT
Updated text search	01/16/2019	LT
Updated text search	06/10/2019	LT

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	Art Unit
	LONG T TRAN	3747

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	F02D41/0025; F02D41/0027; F02D19/0647; F02D19/081; F02D19/0613; F02D19/08; F02D19/105; F02B2043/103; F02B2201/06; F02B2201/064	06/10/2019	lt

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	**Art Unit**
	LONG T TRAN	3747

CPC						
Symbol					**Type**	**Version**
F02D	/	19	/	0613	F	2013-01-01
F02B	/	63	/	04	I	2013-01-01
F02D	/	19	/	0647	I	2013-01-01
F02M	/	19	/	06	I	2013-01-01
F02D	/	19	/	0678	I	2013-01-01
F02D	/	19	/	0681	I	2013-01-01
F02M	/	19	/	08	I	2013-01-01
F02M	/	13	/	08	I	2013-01-01
F02B	/	43	/	00	I	2013-01-01
F02D	/	29	/	06	I	2013-01-01
F02D	/	41	/	062	A	2013-01-01
F02N	/	3	/	02	A	2013-01-01
F02D	/	41	/	0025	A	2013-01-01
Y02T	/	10	/	36	A	2013-01-01
Y02T	/	10	/	32	A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	24	
/LONG T TRAN/ Primary Examiner, Art Unit 3747	10 June 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	**Art Unit**
	LONG T TRAN	3747

INTERNATIONAL CLASSIFICATION				
CLAIMED				
F02D	/	19	/	06
F02M	/	19	/	06

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	24	
/LONG T TRAN/ Primary Examiner, Art Unit 3747	10 June 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	**Art Unit**
	LONG T TRAN	3747

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	7	19	21										
2	2	11	13	20	22										
3	3	12	14	21	23										
4	4	13	15	22	24										
5	5	14	16	23	25										
6	27	15	17	24	26										
7	28	16	18												
8	29	17	19												
9	6	18	20												

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 24	
/LONG T TRAN/ Primary Examiner, Art Unit 3747 (Primary Examiner)	10 June 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	Art Unit
	LONG T TRAN	3747

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

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/29/2018	06/03/2018	01/16/2019	06/10/2019					
1	1	✓	✓	✓	=					
2	2	✓	✓	✓	=					
3	3	✓	✓	✓	=					
4	4	✓	✓	✓	=					
5	5	✓	✓	✓	=					
9	6	✓	✓	✓	=					
10	7	✓	✓	✓	=					
	8	✓	O	O	-					
	9	✓	O	O	-					
	10	✓	O	O	-					
	11	✓	O	O	-					
	12	✓	O	O	-					
11	13	✓	✓	✓	=					
12	14	✓	✓	✓	=					
13	15	✓	✓	✓	=					
14	16	✓	✓	✓	=					
15	17	✓	✓	✓	=					
16	18	✓	✓	✓	=					
17	19	✓	✓	✓	=					
18	20	✓	✓	✓	=					
19	21	✓	✓	✓	=					
20	22	✓	✓	✓	=					
21	23	✓	✓	✓	=					
22	24	✓	✓	✓	=					
23	25	✓	✓	✓	=					
24	26	✓	✓	✓	=					
6	27				=					
7	28				=					
8	29				=					

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	42	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas) propane cng) near10 valve) and ((carburetor carburretor) same intake) and (float$3 same (carburetor carburettor)) and solenoid near3 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/10 14:51
L3	78	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas) propane cng) near10 valve) and (float$3 same (carburetor carburettor)) and solenoid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/10 14:59
L5	461	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas) propane cng) near10 valve) and (float$3 same (carburetor carburettor))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/10 15:01

6/ 10/ 2019 3:03:37 PM
C:\ Users\ ltran2\ Documents\ EAST\ Workspaces\ 15285215.wsp

Customer No. 26629 Patent
Confirmation No. 2429 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:

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 facsimile to Fax No.: 571-273-8300 addressed to **Examiner Long T Tran** at the Patent and Trademark Office.

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

Date: April 25, 2019 /Robyn L. Templin/
Signature

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

AMENDMENT/RESPONSE TO OFFICE ACTION MAILED JANUARY 25, 2019

Dear Sir:

Responsive to the Office Action mailed January 25, 2019, please amend the Application as follows:

In the Claims

1. (Currently Amended) A multi-fuel engine comprising:

an engine operable on a liquid fuel and a gaseous fuel;

a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake, the carburetor comprising a float bowl;

a liquid cutoff solenoid coupled to the carburetor to open and close a liquid fuel path to the engine downstream from the float bowl;

a gaseous cutoff ~~solenoid~~ coupled to open and close a gaseous fuel source to the engine; and

a switch selectively coupling a power source to the liquid cutoff solenoid to open and close the liquid fuel path ~~and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation~~.

2. (Currently Amended) 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~~ positioned on the liquid fuel path, which extends from the float bowl to a throat of~~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. (Currently Amended) The multi-fuel engine of claim 1 wherein the switch actuates the liquid cutoff solenoid ~~and the gaseous cutoff solenoid~~ to enable ~~change~~ changing engine operation between the liquid fuel and the gaseous fuel, so as to prevent fuel flow from the~~a~~ liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.

4. (Currently Amended) 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.

Champion - EX2092, Page 28 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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

6. (Currently Amended) The multi-fuel engine of claim ~~2~~ 1 further comprising a liquid fuel valve positioned on a liquid fuel line coupling the liquid fuel source to the carburetor to open and close the liquid fuel source to the engine~~, actuated by the switch coupled to the power source~~.

7. (Currently Amended) 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 actuating the liquid cutoff solenoid to open the liquid fuel path~~switching operation to liquid fuel~~.

8-12. (Canceled)

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.

Champion - EX2092, Page 29 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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. (Currently Amended) 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 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;

~~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;~~

Champion - EX2092, Page 30 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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

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

21. (Currently Amended) The multi-fuel internal combustion engine of claim 20 wherein the gaseous fuel valve comprises a gaseous fuel cutoff solenoid~~wherein the liquid fuel cutoff solenoid is a carburetor cutoff solenoid coupled to a carburetor~~.

22. (Currently Amended) The multi-fuel internal combustion engine of claim 21 further comprising 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 ~~20 wherein the liquid fuel cutoff solenoid is coupled along the liquid fuel line~~.

23. (Currently Amended) The multi-fuel internal combustion engine of claim ~~20~~ 22 wherein the switch institutes a predefined delay between actuating the carburetor~~liquid fuel~~ cutoff solenoid and the gaseous fuel cutoff solenoid.

24. (Currently Amended) The multi-fuel internal combustion engine of claim ~~20~~ 22 wherein the switch operates the carburetor~~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. (Currently Amended) The multi-fuel internal combustion engine of claim ~~20~~ 22 wherein the gaseous fuel cutoff solenoid and the carburetor~~liquid fuel~~ cutoff solenoid operate as normally closed solenoid valves.

26. (Currently Amended) 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;~~

Champion - EX2092, Page 31 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

27. (New) The multi-fuel engine of claim 1 wherein activating the gaseous cutoff simultaneously activates the liquid cutoff solenoid.

28. (New) The multi-fuel engine of claim 1 wherein the liquid cutoff solenoid is selectively operable to cut off fuel flow from the float bowl to a nozzle in a venturi of the carburetor upstream from a throttle for the engine.

29. (New) The multi-fuel engine of claim 1 wherein the carburetor connects the gaseous fuel source to the intake.

Champion - EX2092, Page 32 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Electronic Acknowledgement Receipt

EFS ID:	35828320
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:	25-APR-2019
Filing Date:	04-OCT-2016
Time Stamp:	12:07:55
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		Response.pdf	172664 d68b04ba8e2d2dfa5ec65bb970e76b94a27a7264	yes	13

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	13
Warnings:			
Information:			
	Total Files Size (in bytes):	172664	

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.

REMARKS

Claims 1-26 are pending in the present application. In the Office Action mailed January 25, 2019, the Examiner rejected claims 1-7 and 20-25 under 35 U.S.C. §103 as being unpatentable over Poehlman (USP 4,489,699) in view of Walker (USP 3,718,000). The Examiner next rejected claims 13-15, 18, and 19 under 35 U.S.C. §103 as being unpatentable over Kern et al. (US Pub. 2004/0139943 – hereinafter "Kern") 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 in view of Poehlman and Walker. Claim 26 was rejected under 35 U.S.C. §103 as being unpatentable over Poehlman in view of Kern and Graf.

Claims 8-12 were indicated as containing allowable subject matter. Such indication is appreciated.

Claim Amendments

Without acquiescing to the rejections, Applicant has elected to amend claims 1-7 and 20-26 in order to further clarify the scope of the invention, with amendments and arguments presented here below for consideration. Claims 8-12 have been canceled, as they are being pursued separately in a Continuation application.

Claim 1 had been amended to include a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake, the carburetor comprising a float bowl; a liquid cutoff solenoid coupled to the carburetor to open and close a liquid fuel path to the engine downstream from the float bowl; a gaseous cutoff coupled to open and close a gaseous fuel source to the engine; and a switch selectively coupling a power source to the liquid cutoff solenoid to open and close the liquid fuel path. Support for the amendment can be found in at least Paragraphs [0027], [0028], [0030], [0031], [0053] of the Specification and FIGS. 1, 2.

Claim 2 has been amended to include that the liquid cutoff solenoid is positioned on the liquid fuel path, which extends from the float bowl to a throat of the carburetor, to open and close the liquid fuel path; and further that the gaseous cutoff couples the gaseous fuel source to the intake to control flow of the gaseous fuel to the engine. Support for the amendment can be found in at least Paragraphs [0028], [0030], [0052] of the Specification and FIGS. 2, 4.

Claim 3 has been amended to include that the switch actuates the liquid cutoff solenoid to enable changing engine operation between the liquid fuel and the gaseous fuel, so as to prevent fuel flow from the liquid fuel source and the gaseous fuel source simultaneously and allow switching

Champion - EX2092, Page 35 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

between fuel sources on-the-fly during engine operation. Support for the amendment can be found in at least Paragraphs [0037], [0040] of the Specification and FIG. 2.

Claim 4 has been amended to include that the switch actuates the liquid cutoff solenoid to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel. Support for the amendment can be found in at least Paragraphs [0030], [0038] of the Specification and FIG. 2.

Claim 5 has been amended to change "a" to "the" to correct antecedent basis with respect to the "liquid fuel source" of amended claim 1

Claim 6 has been amended to change the dependency from claim 2 to claim 1, and to include a liquid fuel valve positioned on a liquid fuel line coupling the liquid fuel source to the carburetor to open and close the liquid fuel source to the engine. Support for the amendment can be found in at least Paragraph [0029] of the Specification and FIG. 2.

Claim 7 has been amended to include that the switch opens the liquid fuel valve to fill the float bowl with liquid fuel prior to actuating the liquid cutoff solenoid to open the liquid fuel path. Support for the amendment can be found in at least Paragraphs [0028], [0029], [0036] of the Specification and FIG. 2.

Claim 20 has been amended to include 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; a carburetor cutoff solenoid coupled to control fuel flow within the carburetor from the liquid fuel line and selectively engage engine operation on liquid fuel; and a gaseous fuel valve coupled to control fuel flow through the gaseous fuel line and selectively engage engine operation on gaseous fuel. Support for the amendment can be found in at least Paragraphs [0027], [0028], [0030], [0031], [0040] of the Specification and FIGS. 1, 2.

Claim 21 has been amended to include that the gaseous fuel valve comprises a gaseous fuel cutoff solenoid. Support for the amendment can be found in at least Paragraph [0030] of the Specification and FIG. 2.

Claim 22 has been amended to change the dependency from claim 20 to claim 21, and to include 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. Support for the amendment can be found in at least Paragraph [0034] of the Specification and FIG. 2.

Claims 23-25 have been amended to change the dependency from independent claim 20 to dependent claim 22, and to change "liquid fuel cutoff solenoid" to "carburetor cutoff solenoid"

Champion - EX2092, Page 36 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

corresponding to amended claim 20. Support for the amendment can be found in at least Paragraph [0028] of the Specification and FIG. 2.

Claim 26 has been amended to remove the limitation to "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" which is now found in amended claim 20, from which claim 26 depends.

Rejections under 35 U.S.C. §103 - Poehlman and Walker

Claim 1

The Examiner rejected independent claim 1 under 35 U.S.C. §103 as being unpatentable over Poehlman in view of Walker. While Applicant does not necessarily agree with the rejection, Applicant has elected to amend claim 1 in the present response - as indicated previously.

Applicant believes that amended claim 1 is patentably distinct from Poehlman and Walker at least for the reason that neither Poehlman nor Walker discloses a switch selectively coupling a power source to the liquid cutoff solenoid to open and close the liquid fuel path to the engine downstream from the float bowl, as called for in claim 1. Instead, Poehlman discloses that a liquid fuel control valve 43 is incorporated along the liquid fuel supply line 19 upstream from the carburetor 15. *Poehlman*, col. 3, lns. 64-66; FIG. 1. Therefore, the Examiner's proposed modification to valves in Poehlman, such as the liquid fuel control valve 43, as instead "being solenoids themselves such as those indicated in Walker" (*Office Action*, 01/25/2019, p. 5) would not result in a liquid cutoff solenoid *coupled* to the carburetor as called for in claim 1. (emphasis added). For similar reasons, the proposed modification would not result in Poehlman having a switch selectively coupling a power source to the liquid cutoff solenoid coupled to the carburetor as called for in claim 1. Further, Walker discloses automatic fuel changeover controlled by temperature sensitive element 81a (*Walker*, col. 3, lns. 33-38), rather than a switch selectively coupling a power source to a liquid cutoff solenoid. Accordingly, Poehlman, Walker, or a combination thereof cannot be said to teach or suggest a switch selectively coupling a power source to the liquid cutoff solenoid to open and close the liquid fuel path to the engine downstream from the float bowl, as called for in claim 1.

In light of at least the above, Applicant believes claim 1 to be patentably distinct over a combination of Poehlman and Walker. As such, Applicant respectfully requests withdrawal of the rejection of claim 1 under 35 U.S.C. §103, and all claims depending therefrom.

Champion - EX2092, Page 37 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Claim 20

The Examiner rejected independent claim 20 under 35 U.S.C. §103 as being unpatentable over Poehlman in view of Walker. While Applicant does not necessarily agree with the rejection, Applicant has elected to amend claim 20 in the present response - as indicated previously.

Applicant believes that amended claim 20 is patentably distinct from Poehlman and Walker at least for the reason that neither Poehlman nor Walker teaches or suggests a carburetor to mix air and fuel and connect to the liquid fuel line and the gaseous fuel line with a carburetor cutoff solenoid coupled to control fuel flow within the carburetor from the liquid fuel line, as called for in claim 20. Initially, Poehlman does not disclose a carburetor cutoff solenoid coupled to control fuel flow within the carburetor. As stated above with respect to claim 1, Poehlman instead discloses that a liquid fuel control valve 43 is incorporated along the liquid fuel supply line 19 upstream from the carburetor 15. *Poehlman*, col. 3, lns. 64-66; FIG. 1. Further, Poehlman's carburetor 15 operates via a vacuum switch 47 to initiate fuel changeover based on the amount of liquid fuel supplied from the fuel bowl 17. *Poehlman*, col. 6, lns. 21-62. Thus, assuming *arguendo*, the addition of a carburetor cutoff solenoid coupled to control fuel flow within the carburetor 15 would likely impede operation of the vacuum switch 47 and therefore would not be obvious to a skilled artisan. Further, Walker has not been shown to disclose a carburetor coupled to an intake of the engine to mix air and fuel and connect to a liquid fuel line and a gaseous fuel line, as called for in claim 20. Therefore, the combination of Poehlman and Walker cannot be said to teach or suggest a carburetor to mix air and fuel and connect to the liquid fuel line and the gaseous fuel line with a carburetor cutoff solenoid coupled to control fuel flow within the carburetor from the liquid fuel line, as called for in claim 20.

In light of at least the above, Applicant believes claim 20 to be patentably distinct over a combination of Poehlman and Walker. As such, Applicant respectfully requests withdrawal of the rejection of claim 20 under 35 U.S.C. §103, and all claims depending therefrom.

Rejection under 35 U.S.C. §103 Kern and Graf

Claim 13

The Examiner rejected independent claim 13 under 35 U.S.C. §103 as being unpatentable over Kern in view of Graf.

Claim 13 includes, in part, 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

Champion - EX2092, Page 38 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

In rejecting the claim, the Examiner asserted that Kern teaches the claimed engine and alternator 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, p. 12-13. Applicant respectfully disagrees with the rejection.

Contrary to the Examiner's assertion, 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.

Kern similarly fails to teach or suggest 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.

Accordingly, Applicant believes claim 13 to be patentably distinct over a combination of Kern and Graf, and thus Applicant requests withdrawal of the rejection of claim 13 and all claims depending therefrom.

Newly Presented Claims

In addition to the above amendments and remarks, Applicant has newly presented claims 27-29 in the present response. Support for new claim 27 can be found at least in Paragraphs [0028], [0030], [0037] and in FIG. 2. Support for new claim 28 can be found at least in Paragraphs [0028],

Champion - EX2092, Page 39 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

[0051], [0052] and in FIGS. 2, 4. Support for new claim 29 can be found at least in Paragraphs [0026], [0027] and in FIG. 2.

Claim 27 is believed to be patentably distinct over the applied prior art, as the combination of Poehlman and Walker cannot be said to teach or suggest wherein activating the gaseous cutoff simultaneously activates the liquid cutoff solenoid.

Claim 28 is believed to be patentably distinct over the applied prior art, as the combination of Poehlman and Walker cannot be said to teach or suggest wherein the liquid cutoff solenoid is selectively operable to cut off fuel flow from the float bowl to a nozzle in a venturi of the carburetor upstream from a throttle for the engine.

Claim 29 is believed to be patentably distinct over the applied prior art, as the combination of Poehlman and Walker cannot be said to teach or suggest wherein the carburetor connects the gaseous fuel source to the intake.

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 1-7 and 13-29.

No fees are deemed necessary for the claims newly presented herein, as a greater number of claims have been canceled.

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,

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Dated: April 25, 2019
Attorney Docket No.: CET1090.044

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Champion - EX2092, Page 40 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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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Dated: April 25, 2019
Attorney Docket No.: CET1090.044

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Champion - EX2092, Page 41 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

PTO/SB/06 (09-11)
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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

FOR	(Column 1) NUMBER FILED	(Column 2) 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), (i), 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	04/25/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 24	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

		(Column 1)		(Column 2)	(Column 3)			
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".	/POLIN ANG/
*** 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.	

This collection of information is required by 37 CFR 1.16. 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 12 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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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 01/25/2019

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EXAMINER
TRAN, LONG T

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
01/25/2019	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 Status Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- 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 13 November 2018.

☐ 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) 1-7 and 13-26 is/are rejected.

8) ☑ Claim(s) 8-12 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 _____ 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)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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. In view of the Appeal Brief filed on November 13, 2018, PROSECUTION IS HEREBY REOPENED. The new grounds of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/LINDSAY M LOW/
Supervisory Patent Examiner, Art Unit 3747

3. The following Office Action is in response to Claims filed May 2, 2018 in which the Final Office Action issued by the Examiner on June 8, 2018 has been withdrawn.

4. Claims 1 – 26 remain pending in the application and have been fully considered.

Claim Rejections - 35 USC § 103

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

6. 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.

7. 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.

8. 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.

9. Claims 1 – 7, 20 – 25 are rejected under 35 U.S.C. 103 as being unpatentable over Poehlman (US 4,489,699) and in view of Walker (US 3,718,000).

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 (43) coupled to open and close a liquid fuel path to the engine; a gaseous cutoff (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 and the gaseous cutoff to switch between fuel sources on-the-fly during engine operation.

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

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

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman

teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 3:

Poehlman teaches the switch actuates the liquid cutoff and the gaseous cutoff 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).

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 4:

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

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 5:

Poehlman teaches the 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 (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) 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.

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman

teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 21:

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

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 22:

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

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

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 and the gaseous fuel cutoff to substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine (Col 4 and Col 6).

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid

84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

Regarding Claim 25:

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

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid

coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

10. 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 (5) 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 5 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 5 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.

11. 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) and Walker (US 3,718,000).

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 (via ECM 10 and switch 51) coupled to a carburetor (15) to control liquid fuel flow to the engine, and a gaseous fuel cutoff (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 Poelhman in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

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 (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 Poelhman in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid.

However, Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the liquid cutoff solenoid and gaseous cutoff solenoid of Walker in the engine of Poehlman in order to minimize the connective elements of an electromechanical control for each fuel cutoff (e.g. Poehlman teaches valves 43 and 45 energized by a switch 51 that is powered by solenoid coils 81 and 83, but would be more compact with the valves being solenoids themselves such as those indicated in Walker).

12. 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.

Allowable Subject Matter

13. Claims 8 - 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

14. Applicant's arguments with respect to claims 1 - 26 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

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 Mon - Fri 9:00 - 5:00.

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.

/LONG T TRAN/
Primary Examiner, Art Unit 3747

/LINDSAY M LOW/
Supervisory Patent 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-20150122230-A1	05-2015	Sarder; Mark J.	F02D19/0647	123/525
*	B	US-20140373531-A1	12-2014	Wong; Jim	F02B43/02	60/605.1
*	C	US-20140238340-A1	08-2014	Dunn; Mark E.	F02M43/00	123/299
*	D	US-20070137591-A1	06-2007	Sugimoto; Yasuhiro	F02B43/00	123/41.7
*	E	US-20040139943-A1	07-2004	Kern, Robert D.	F01P11/16	123/198D
*	F	US-6591817-B2	07-2003	Deutsch; Robert W.	F02D19/0647	123/525
*	G	US-20020134362-A1	09-2002	Deutsch, Robert W.	F02D19/0647	123/575
*	H	US-5611312-A	03-1997	Swanson; Mark S.	F02M1/02	123/179.18
*	I	US-5450832-A	09-1995	Graf; Bruce R.	F02M13/08	123/515
*	J	US-4489699-A	12-1984	Poehlman; Arthur G.	F02B69/04	123/525
*	K	US-3783849-A	01-1974	Bramfitt; Thomas Hugh	F02M13/06	123/179.16
*	L	US-3718000-A	02-1973	Walker; Brooks	F02B11/02	123/525
	M					

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.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	Art Unit
	LONG T TRAN	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
Updated text search	6/3/2018	LT
Updated text search	01/16/2019	LT

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/285,215	Collie et al.
	Examiner	Art Unit
	LONG T TRAN	3747

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

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/29/2018	06/03/2018	01/16/2019						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	O	O						
	9	✓	O	O						
	10	✓	O	O						
	11	✓	O	O						
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	22	✓	✓	✓						
	23	✓	✓	✓						
	24	✓	✓	✓						
	25	✓	✓	✓						
	26	✓	✓	✓						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L9	40	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas)) near5 fuel same valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4 transition$4 between) near5 fuel) and (float$3 same (carburetor carburettor)) and gasoline and solenoid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/16 10:54
L10	40	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas)) near5 valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4 transition$4 between) near5 fuel) and (float$3 same (carburetor carburettor)) and gasoline and solenoid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/16 10:54
L11	35	engine and ((gasoline liquid) near5 valve) and ((gas$4 lpg ng (natural adj gas)) near5 valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4 transition$4 between) near5 fuel) and (float$3 same (carburetor carburettor)) and solenoid near3 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/16 10:55

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Customer No. 26629 Patent
Confirmation No. 2429 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

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Date: November 13, 2018 /Robyn L. Templin/
Signature

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

APPEAL BRIEF PURSUANT TO 37 C.F.R §41.37

Dear Sir:

This Appeal Brief is being filed in furtherance of the Notice of Appeal filed on September 10, 2018.

1. REAL PARTY IN INTEREST

The real party in interest is Champion Engine Technology, LLC by virtue of the Assignment recorded October 10, 2016, at reel 039975, frame 0109.

2. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellant's legal representative in this Appeal. Champion Engine Technology, LLC, the Assignee of the above-referenced application, as evidenced by the documents mentioned above, will be directly affected by the Board's decision in the pending appeal.

3. SUMMARY OF CLAIMED SUBJECT MATTER

The following is a summary of the claimed subject matter of independent claims 1, 13, and 20 as disclosed in the specification with supporting citations to reference numerals and page and line numbers in accordance with 37 C.F.R. §41.37(c)(1)(iii).

Claim 1 calls for a multi-fuel engine (34) comprising an engine operable on a liquid fuel and a gaseous fuel. *Specification*, ¶¶ [0019]-[0020]; FIG. 1. A liquid cutoff solenoid (94) is coupled to open and close a liquid fuel path (150) to the engine (34). *Specification*, ¶¶ [0019], [0028] and [0052]; FIGS. 1-2 and 4. A gaseous cutoff solenoid (98) is coupled to open and close a gaseous fuel source (82) to the engine (34). *Specification*, ¶¶ [0019] and [0030]; FIGS. 1-2. A switch (54) couples a power source (102) to the liquid cutoff solenoid (94) and the gaseous cutoff solenoid (98) to switch between fuel sources on-the-fly during engine (34) operation. *Specification*, ¶¶ [0019], [0028] and [0034]; FIGS. 1-2.

Claim 13 calls for a multi-fuel generator (30) and fuel delivery system (32) comprising a multi-fuel internal combustion engine (34) 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 pressurized fuel source (50) through a gaseous fuel line (84), and an

Champion - EX2092, Page 69 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

alternator (40) driven by the multi-fuel internal combustion engine (34). *Specification*, ¶¶ [0019]-[0020], and [0026]; FIGS. 1-2. The multi-fuel generator (30) and fuel delivery system (32) also includes a fuel regulator system (56) comprising a primary pressure regulator (64) coupled to a service valve (60) of the pressurized fuel source (50) to regulate fuel supplied from the pressurized fuel source (50) to a reduced pressure, and a secondary pressure regulator (66) coupled to the primary pressure regulator (64) to regulate fuel supplied from the primary pressure regulator (64) to a desired pressure for delivery through the gaseous fuel line (84) to operate the engine (34). *Specification*, ¶¶ [0019]-[0022], and [0026]; FIGS. 1 and 2. An electro-mechanical valve system (76) is coupled to the engine (34) and operated by an electrical switch (54) powered by one of the alternator (40), a battery (102), and a magneto (102) that controls fuel flow to the engine (34) from the liquid fuel source (78) and the pressurized fuel source (50). *Specification*, ¶¶ [0019]-[0020], [0026], and [0031]; FIGS. 1 and 2.

Claim 20 calls for a multi-fuel internal combustion engine (34) comprising an engine operable on liquid fuel supplied through a liquid fuel line (80) from a liquid fuel source (78) and gaseous fuel supplied through a gaseous fuel line (84) from a pressurized fuel source (82). *Specification*, ¶¶ [0019] and [0026]; FIGS. 1-2. The multi-fuel internal combustion engine (34) also includes a switch (54) to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running. *Specification*, ¶¶ [0019] and [0034]; FIGS. 1 and 2. A liquid fuel cutoff solenoid (94) is coupled to control fuel flow through the liquid fuel line (80) and engage engine (34) operation on liquid fuel upon actuation of the switch (54) from gaseous fuel to liquid fuel. *Specification*, ¶¶ [0019], [0028] and [0040]; FIGS. 1-2. A gaseous fuel cutoff solenoid (98) is coupled to control fuel flow through the gaseous fuel line (84) and engage engine (34) operation on gaseous fuel upon actuation of the switch (54) from liquid fuel to gaseous fuel. *Specification*, ¶¶ [0019] and [0040]; FIGS. 1-2.

Champion - EX2092, Page 70 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

4. **ARGUMENTS**

Rejections under 35 U.S.C. §102 - Poehlman (US 4,489,699 - "Poehlman")

Claim 1

Claim 1 was rejected under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. 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." *Final Office Action*, 06/08/2018, p. 3.

Appellant respectfully disagrees with the rejection. Specifically, Poehlman does not anticipate that which is called for in claim 1, as anticipation under 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

Champion - EX2092, Page 71 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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

Champion - EX2092, Page 72 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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 *[sic]* 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" (*Final Office Action*, p. 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.

Champion - EX2092, Page 73 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

In the Response to Arguments section of the Final Office Action, the Examiner asserted that Poehlman discloses a liquid cutoff solenoid because "Poehlman clearly teaches control means 41 selectively opens and closes valve 43 in response to electrical energization (Col 3 line 63 to Col 4 line 2), thus meeting the broad but reasonable interpretation of a solenoid valve." *Final Office Action*, p. 14. In reaching that determination, the Examiner stated that "a broad but reasonable interpretation of a 'liquid cutoff' is understood by the Examiner as any kind of valve-like structure that controls the flow of fuel. In addition, a 'solenoid valve' is understood by the Examiner to encompass any valve with electric actuation (see Wikipedia and general searches on solenoid type valves)." *Id.* However, the MPEP states that "the meaning given to a claim term must be consistent with the ordinary and customary meaning of the term . . . [and] the broadest reasonable interpretation of the claims must be consistent with the interpretation that those skilled in the art would reach." *MPEP § 2111* (citing *In re Cortright*, 165 F.3d 1353, 1359 (Fed. Circ. 1999)). In the present case, a skilled artisan would readily recognize the term "solenoid" to mean "a coil of wire usually in cylindrical form that when carrying a current acts like a magnet so that a movable core is drawn into the coil when a current flows and that is used especially as a switch or control for a mechanical device (such as a valve)." *Merriam-Webster Online Dictionary*, https://www.merriam-webster.com/dictionary/solenoid, accessed October 2, 2018 (attached as APPENDIX A).

Therefore, a skilled artisan would readily recognize that a liquid cutoff solenoid includes a coil of wire that when carrying a current draws a movable core into the coil, rather than a solenoid valve being "any valve with electric actuation" (*Quoting Final Office Action*, p. 14) as relied upon by the Examiner in asserting the liquid fuel control valve 43 discloses a solenoid. Therefore, Poehlman's liquid fuel control valve 43 has not been shown to disclose a liquid cutoff solenoid, as called for in claim 1. For similar reasons, Poehlman's gaseous fuel control valve 45 has not been shown to disclose a gaseous cutoff solenoid, as called for in claim 1. Since Poehlman does not disclose the solenoids of claim 1, Poehlman does not anticipate the claim since "[a] claim is anticipated only if each and every element as set forth in the claim is found, either

Champion - EX2092, Page 74 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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)).

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 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)). Appellant therefore respectfully requests reversal of the rejection of claim 1 and the claims dependent therefrom.

Claim 2

The Examiner rejected dependent claim 2 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In support of the rejection, the Examiner characterized Poehlman as teaching "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." *Final Office Action*, p. 3. The Examiner referred to Poehlman's liquid fuel control valve 43 as the "liquid cutoff solenoid (43)" in the rejection of claim 1, from which claim 2 depends. *Id.* Appellant respectfully disagrees.

Champion - EX2092, Page 75 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Poehlman discloses that engine 13 includes control means 41 for selective change-over between use of liquid fuel and gaseous fuel. *Poehlman*, Col. 3, lns. 62-64. The control means 41 includes a liquid fuel control valve 43 incorporated in the liquid fuel supply line 19. *Poehlman*, Col. 3 lines 64-66.

Claim 2 calls for, in part, 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.

Contrary to the Examiner's assertion, Poehlman does not disclose that liquid fuel control valve 43 is a liquid cutoff solenoid coupled to a carburetor to open and close a liquid fuel path downstream from a float bowl in the carburetor. Initially, as stated above with respect to claim 1, Poehlman does not disclose that liquid fuel control valve 43 is a liquid cutoff solenoid. In addition, the liquid fuel control valve 43 is not *coupled to* the carburetor 15 to open and close a liquid fuel path downstream from fuel bowl 17. Instead, the liquid fuel control valve 43 is incorporated along the liquid fuel supply line 19 upstream from the carburetor 15. *Poehlman*, Col. 3, lns. 64-66; FIG. 1. The liquid fuel supply line 19 extends from the carburetor 15 to the liquid fuel source 21 with the "liquid fuel control valve 43 [] incorporated in the liquid fuel supply line 19." *Id.* Thus, the liquid fuel control valve 43 is in fact positioned off of and remote from the carburetor 15 and coupled along the liquid fuel supply line 19 upstream from the carburetor 15, rather than downstream from the fuel bowl 17. Therefore, the liquid fuel control valve 43 is not coupled to the carburetor 15 to open and close a liquid fuel path downstream from the fuel bowl 17 in the carburetor. Accordingly, the Examiner has not shown that Poehlman discloses a liquid cutoff solenoid coupled to a carburetor to open and close a liquid fuel path downstream from a float bowl in the carburetor, as called for in claim 2.

As such, Poehlman has not been shown to teach or suggest each and every element of claim 2. Therefore, Appellant believes claim 2 is patentably distinct from Poehlman and respectfully requests reversal of the rejection of claim 2, and the claims depending therefrom.

Champion - EX2092, Page 76 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Claim 3

The Examiner rejected dependent claim 3 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In support of the rejection, the Examiner stated:

> 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).

Final Office Action, p. 3. Appellant respectfully disagrees with the rejection.

In addition to the description of Poehlman above with respect to claim 1, Poehlman discloses that, 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. However, the engine 13 continues to run on the liquid fuel in the carburetor bowl 17. *Poehlman*, Col. 6, lns. 25-27. Once the engine begins to run out of the liquid fuel in the fuel bowl 17, the inlet manifold vacuum then drops to an amount less than or below the predetermined level thereby closing the vacuum switch 47 which energizes the solenoid coils 81 and 83. *Poehlman*, Col. 6, lns. 27-33. The first solenoid coil 81 acts to displace the first switch member 65 to the terminal 63, thereby energizing the gaseous fuel control valve 45 to the open position. *Poehlman*, Col. 6, lns. 33-36.

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 *[sic]* to the open position and the carburetor bowl 17 begins to fill. *Poehlman*, Col. 6, lns. 45-47. The gaseous fuel control valve 45 is retained open until the engine 13 begins to run on both fuels. *Poehlman*, Col. 6, lns. 49-55. The vacuum condition at the vacuum switch 47 then drops below the predetermined level, thereby closing the vacuum switch 47, which closure energizes the second solenoid coil 83. *Poehlman*, Col. 6, lns. 55-59. The second solenoid coil 83 shifts the second switch member 79 to the holding terminal 77 deenergizing and closing the gaseous fuel control valve 45. *Poehlman*, Col. 6, lns. 59-62.

Champion - EX2092, Page 77 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Claim 3 calls for, in part, a switch that actuates a liquid cutoff solenoid and a gaseous cutoff solenoid to change engine operation between liquid fuel and gaseous fuel so as to prevent fuel flow from a liquid fuel source and a gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.

Contrary to the Examiner's assertion, Poehlman does not disclose a switch that actuates a liquid cutoff solenoid and a gaseous cutoff solenoid to change engine operation between liquid fuel and gaseous fuel so as to prevent fuel flow from a liquid fuel source and a gaseous fuel source simultaneously, as called for in claim 3. While the Examiner cited to col. 4 lines 3-69 of Poehlman as disclosing the subject matter of claim 3, the Examiner did not point to any specific language of Poehlman within those passages as disclosing the claimed subject matter. *Final Office Action*, p. 3. Instead, Poehlman actually discloses that liquid fuel control valve 43 is located along liquid fuel supply line 19 upstream from carburetor 15 to turn off the liquid fuel supply to the carburetor 15. *Poehlman*, Col. 3, lns. 64-66; Col. 6, lns. 23-25. Once the engine 13 begins to run out of the liquid fuel in the fuel bowl 17, the gaseous fuel control valve 45 is energized to the open position. *Poehlman*, Col. 6, lns. 27-36. Accordingly, the gaseous fuel control valve 45 engages gaseous fuel operation while the fuel bowl 17 is draining such that both liquid fuel and gaseous fuel are simultaneously provided to the engine 13. The Examiner has not shown that gaseous fuel is engaged only after liquid fuel stops flowing from the fuel bowl 17 to the engine 13.

Further, the liquid fuel control valve 43 is opened and the carburetor bowl 17 begins to fill. *Poehlman*, Col. 6, lns. 45-47. However, the gaseous fuel control valve 45 is retained open until the engine 13 begins to run on both fuels. *Poehlman*, Col. 6, lns. 49-55. Therefore, the liquid fuel control valve 43 engages liquid fuel operation while the gaseous fuel control valve 45 is open such that both gaseous fuel and liquid fuel are simultaneously provided to the engine 13. One skilled in the art would readily recognize that a fuel control system like that disclosed by Poehlman, with the liquid fuel control valve 43 upstream from the carburetor 15 likely relies upon overlapping gaseous fuel and liquid fuel operation to prevent the engine 13 from stalling during fuel changeover. As stated above, simultaneous fuel delivery of liquid fuel and gaseous fuel is provided to the

Champion - EX2092, Page 78 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

engine 13 during crossover switching from both of fuels. As such, Poehlman has not been shown to disclose that a switch actuates a liquid cutoff solenoid and a gaseous cutoff solenoid to change engine operation between liquid fuel and gaseous fuel so as to prevent fuel flow from a liquid fuel source and a gaseous fuel source simultaneously, as called for in claim 3.

Accordingly, Poehlman does not teach or suggest each and every element of claim 3. Therefore, Appellant believes claim 3 is patentably distinct from Poehlman and respectfully requests reversal of the rejection of claim 3.

Claim 4

The Examiner rejected dependent claim 4 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In support of the rejection, the Examiner stated that "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)." *Final Office Action*, p. 4. Appellant respectfully disagrees with the rejection.

Poehlman discloses, regarding changeover to gaseous fuel, once the engine begins to run out of the liquid fuel in the fuel bowl 17, the inlet manifold vacuum then drops to an amount less than or below the predetermined level thereby closing the vacuum switch 47 which energizes the solenoid coils 81 and 83. *Poehlman*, Col. 6, lns. 27-33. The first solenoid coil 81 acts to displace the first switch member 65 to the terminal 63, thereby energizing the gaseous fuel control valve 45 to the open position. *Poehlman*, Col. 6, lns. 33-36.

Poehlman also discloses, regarding changeover to liquid fuel, after the carburetor bowl 17 begins to fill, the gaseous fuel control valve 45 is retained open until the engine 13 begins to run on both fuels. *Poehlman*, Col. 6, lns. 45-55. The vacuum condition at the vacuum switch 47 then drops below the predetermined level, thereby closing the vacuum switch 47, which closure energizes the second solenoid coil 83. *Poehlman*, Col. 6, lns. 55-59. The second solenoid coil 83 shifts the second switch member 79 to the holding terminal 77 deenergizing and closing the gaseous fuel control valve 45. *Poehlman*, Col. 6, lns. 59-62.

Champion - EX2092, Page 79 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Regarding the liquid fuel control valve 43, 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 *[sic]* to the open position. *Poehlman*, Col. 6, lns. 45-46.

Contrary to the Examiner's assertion, Poehlman does not disclose that a switch actuates a gaseous cutoff solenoid and a liquid cutoff solenoid in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel, as called for in claim 4. In the rejection of claim 1, from which claim 4 depends, the Examiner referred to Poehlman's selector switch 51 as "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." *Final Office Action*, p. 3. However, the gaseous fuel control valve 45 operates via vacuum switch 47 when the inlet manifold vacuum drops to an amount less than or below a predetermined level, instead of by actuation of selector switch 51.

In opening the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the engine 13 begins to run out of liquid fuel in the fuel bowl 17. That is, engine 13 operation on gaseous fuel is engaged by vacuum switch 47 energizing the first solenoid coil 81 to displace first switch member 65 energizing gaseous fuel control valve 45 to the open position. *Poehlman*, Col. 6, lns. 30-36. However, the vacuum switch 47 opens the gaseous fuel control valve 45 when inlet manifold vacuum drops below a predetermined level and therefore operates independently of selector switch 51.

In closing the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the fuel bowl 17 fills and the engine 13 begins to run on both fuels. That is, engine 13 operation on gaseous fuel is disengaged by vacuum switch 47 energizing the second solenoid coil 83 to shift second switch member 79 deenergizing gaseous fuel control valve 45 to the closed position. *Poehlman*, Col. 6, lns. 55-62.

Champion - EX2092, Page 80 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

However, the vacuum switch 47 closes the gaseous fuel control valve 45 when inlet manifold vacuum drops below a predetermined level and therefore operates independently of selector switch 51.

Since the gaseous fuel control valve 45 is operated by the vacuum switch 47 independently from the selector switch 51, the Examiner has not shown that the gaseous fuel control valve 45 actuates via the selector switch 51. Accordingly, the Examiner has not shown that Poehlman discloses a switch that actuates a gaseous cutoff solenoid and a liquid cutoff solenoid in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel, as called for in claim 4. Therefore, Appellant believes claim 4 is patentably distinct from the art of record and respectfully requests reversal of the rejection thereof.

Claim 6

The Examiner rejected dependent claim 6 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In support of the rejection, the Examiner stated that "Regarding Claim 6: Poehlman teaches a liquid fuel valve (43) coupling the liquid fuel source to the carburetor, actuated by the switch coupled to the power source." *Final Office Action*, p. 4. The Examiner referred to Poehlman's liquid fuel control valve 43 as the "liquid cutoff solenoid (43)" in the rejection of claim 1, from which claim 6 depends (via intervening claim 2). *Id.* at p. 3. Appellant respectfully disagrees with the rejection to claim 6.

Claim 6 calls for, in part, a liquid fuel valve coupling the liquid fuel source to the carburetor, actuated by the switch coupled to the power source. By dependency on claim 1 (via intervening claim 2), claim 6 further calls for, in part, a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine.

The Examiner's rejection of claim 6 improperly relied on a single element of Poehlman -- liquid fuel control valve 43 - as teaching two separate claim elements: a liquid fuel valve and a liquid cutoff solenoid. *Final Office Action*, pp. 2-4. Claim 6 separately calls for a liquid fuel valve and a liquid cutoff solenoid having distinct claimed relationships to a carburetor. That is, by dependency on claim 2, claim 6 requires that the liquid cutoff solenoid is coupled to the carburetor to open and close a liquid fuel path

Champion - EX2092, Page 81 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

downstream from a float bowl in the carburetor. In contrast, claim 6 also requires the liquid fuel valve coupling a liquid fuel source to the carburetor. Poehlman's liquid fuel control valve 43 does not disclose both the liquid fuel valve and the liquid cutoff solenoid having separate relationships to the carburetor of claim 6.

It is improper to rely on a single element in a reference as disclosing two separate claimed elements. *Ex parte Weideman*, Appeal No. 2008-003454, p. 7 (Bd. Pat. App. & Inter. 2009) (stating that "it is improper to rely on the same structure in the Lohr reference as being responsive to two different elements . . . in claim 1"); *Ex parte Koutsky*, Appeal No. 2008-0557, p. 5 (Bd. Pat. App. & Inter. 2008) (explaining that "a claim requires two separate elements[,] using one element construed as performing two separate functions will not suffice to meet the terms of the claim."); *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999) (holding that a structure having only two means was not sufficient to anticipate a claim requiring three separate fastening means); *Lantech, Inc. v. Keip Mach. Co.*, 32 F.3d 542, 546 (Fed. Cir. 1994) (holding that a single conveyor did not meet a claim element requiring at least two conveyors). As such, the Examiner's apparent interpretation of liquid fuel control valve 43 as teaching both a liquid fuel valve and a liquid cutoff solenoid is improper and does not support a proper rejection under 35 U.S.C. §102.

As set forth in MPEP § 2131, "[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." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). As Poehlman has not been shown to teach or suggest each and every element called for in claim 6, Poehlman cannot be considered anticipatory under 35 U.S.C. §102(a)(2). Therefore, the rejection of claim 6 should be reversed, along with the rejections of all claims depending therefrom.

Claim 20

The Examiner rejected independent claim 20 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In rejecting claim 20, the Examiner asserted (in part) that Poehlman discloses:

Champion - EX2092, Page 82 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

> 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.

Final Office Action, p. 4-5. Appellant respectfully disagrees with the rejection.

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

Champion - EX2092, Page 83 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Claim 20 calls for a multi-fuel internal combustion engine including 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.

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. As stated above with regard to claim 1, a "solenoid valve" is not inherently disclosed by "any valve with electric

Champion - EX2092, Page 84 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

actuation," contrary to the Examiner's statement in the Response to Arguments section of the Final Office Action. *Quoting Final Office Action*, p. 14. For similar reasons, the liquid fuel control valve 43 and the gaseous fuel control valve 45 do not expressly or inherently disclose solenoids.

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.

Accordingly, Poehlman does not disclose each and every element of claim 20 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)).

Further, contrary to the Examiner's assertion, Poehlman does not disclose "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." *Quoting Final Office Action*, p. 5. As stated above with respect to claim 1, there is no disclosure in Poehlman that the liquid fuel control valve 43 and gaseous fuel control valve 45 are ***solenoids***. Further, Poehlman discloses the fuel selector switch 51 is moved to the gaseous fuel position resulting in the liquid fuel control valve 43 being deenergized turning off the liquid fuel supply to the carburetor 15. *Poehlman*, Col. 6, lns. 21-25. However, the engine 13 continues to run on only liquid fuel until the engine begins to run out of the liquid fuel in the fuel bowl 17. *Poehlman*, Col. 6, lns. 25-36. Accordingly, engine 13 operation on gaseous fuel is *not* engaged before the fuel bowl 17 begins to run out of liquid fuel. "The vacuum then drops to an amount less than or below the predetermined level thereby closing the vacuum switch 47

Champion - EX2092, Page 85 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

which energizes the solenoid coils 81 and 83." *Poehlman*, Col. 6, lns. 30-33. "The first solenoid coil 81 acts to displace the first switch member 65 to the terminal 63, thereby energizing the gaseous fuel control valve 45 to the open position." *Poehlman*, Col. 6, lns. 33-36. Thus, the gaseous fuel control valve 45 is energized to the open position only after the fuel bowl 17 begins to run out of liquid fuel rather than by actuation of the selector switch 51.

More particularly, engine 13 operation on gaseous fuel is engaged by vacuum switch 47 energizing the first solenoid coil 81 to displace first switch member 65 energizing gaseous fuel control valve 45. *Poehlman*, Col. 6, lns. 30-36. However, the vacuum switch 47 operates when inlet manifold vacuum drops below a predetermined level and therefore operates independently of selector switch 51. That is, the gaseous fuel control valve 45 operates via vacuum switch 47 when the inlet manifold vacuum drops to an amount less than or below a predetermined level instead of by actuation of selector switch 51. Since the gaseous fuel control valve 45 is operated by the vacuum switch 47 independently from the selector switch 51, the Examiner has not shown that the gaseous fuel control valve 45 opens *upon actuation of the selector switch 51 from liquid fuel to gaseous fuel*.

Accordingly, Poehlman has not been shown to teach or suggest 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, as called for in claim 20. Therefore, Poehlman cannot be said to anticipate that which is called for in claim 20, as anticipation under 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)). Accordingly, Appellant believes claim 20 is patentably distinct from Poehlman and respectfully requests reversal of the rejection of claim 20, and the claims depending therefrom.

Champion - EX2092, Page 86 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Claim 23

The Examiner rejected dependent claim 23 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. According to the Examiner, "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)." *Final Office Action*, p. 5. Appellant respectfully disagrees.

Contrary to the Examiner's assertion, there is no disclosure provided in Poehlman of a switch that institutes a *predefined delay* between actuating the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid, as called for in claim 23. Instead, Poehlman discloses the vacuum switch 47 actuates the gaseous fuel control valve 45 after inlet manifold vacuum drops below a predetermined level. In opening the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the engine 13 begins to run out of liquid fuel in the fuel bowl 17. *Poehlman*, Col. 6, lns. 27-36. In closing the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the fuel bowl 17 fills and the engine 13 begins to run on both fuels. *Poehlman*, Col. 6, lns. 45-62. Thus, the vacuum switch 47 actuates the gaseous fuel control valve 45 based on inlet manifold vacuum conditions caused by deficient/excess fuel flow therein rather than based upon a *predefined delay*. In addition, since the vacuum switch 47 actuates the gaseous fuel control valve 45, the gaseous fuel control valve is not actuated by the selector switch 51. Therefore, selector switch 51 has not been shown to institute a predefined delay between actuating the liquid fuel control valve 43 and the gaseous fuel control valve 45.

Thus, Poehlman does not teach or suggest a switch that institutes a predefined delay between actuating a liquid fuel cutoff solenoid and a gaseous fuel cutoff solenoid, as called for in claim 23. Accordingly, Appellant believes claim 23 is patentably distinct from Poehlman.

Champion - EX2092, Page 87 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Rejections under 35 U.S.C. §103 - Kern et al. (US Pub. 2004/0139943 – hereinafter "Kern") and Graf (USP 5,450,832 - "Graf")

Claim 13

The Examiner rejected independent claim 13 under 35 U.S.C. §103 as being unpatentable over Kern in view of Graf. In rejecting the claim, the Examiner asserted that Kern teaches the 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.

Final Office Action, p 7-8. Appellant respectfully disagrees with the rejection. As set forth in MPEP § 2142, "[t]he examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness." MPEP § 2142 (emphasis in original). "With regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not." *Id.* (emphasis in original).

Below Appellant will show that neither Kern, Graf, nor a combination of Kern and Graf teaches or suggests the claimed invention. Further there is no motivation to combine the teachings of Kern and Graf that would render the claimed invention obvious. Accordingly, the Examiner has not established a prima facie case of obviousness under 35 U.S.C. § 103 with respect to claim 13.

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

Champion - EX2092, Page 88 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 4-6. 44-47. Pressure of the alternate fuel is 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, lns. 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, lns. 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, lns. 55-59. The main branch of alternate fuel supply line 4 leads to primary port 28 of pilot control valve 29. *Graf*, Col. 4, lns. 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, lns. 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, lns. 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

Champion - EX2092, Page 89 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

of the pilot control valve 29 at its bonnet side. *Graf*, Col. 5, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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

Champion - EX2092, Page 90 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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 addition, "obviousness concerns whether a skilled artisan not only *could have made but would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention." *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (citing *InTouch Technologies, Inc. v. VGO Communications, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014)). An obviousness "rejection cannot be predicated on the mere identification in [the prior art] of individual components of claimed limitations." *In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000). It is not sufficient to state "that all aspects of the claimed invention were individually known in the art... to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references." MPEP §2143.01(IV) (citing *Ex parte Levengood*, 28 USPQ2d 1300 (Bd.

Champion - EX2092, Page 91 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Pat. App. & Inter. 1993). Accordingly, to establish a *prima facie* case of obviousness, an examiner must not only show that the proposed combination includes each and every element of the claimed invention, but also provide "a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Examiner must make "an explanation-supported finding that the evidence affirmatively provided that the PHOSITA would have sought" the additional feature(s). *See In re Nuvasive*, 842 F.3d 1376, 1384 (Fed. Cir. 2016).

In light of the above, and contrary to the Examiner's assertion, it would not "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." *Final Office Action*, p. 8. The Examiner's proposed combination would not be obvious to one of ordinary skill in the art since substituting an engine with the dual fuel system of Graf into the generator set 10 of Kern would change the principle operation of Kern. That is, Kern's "method includes the steps of providing diesel fuel to the cylinders of the engine for ignition and providing a flow of gaseous fuel to the engine." *Kern*, ¶ [0016]. According to Kern, "the natural gas contribution to the fuel mixture will vary between 0 percent and approximately 90 percent of the total fuel provided to engine 12." *Id.* ¶ [0028]. "The operating conditions of the engine and the generator are monitored and the flow of gaseous fuel to the engine is adjusted in response to predetermined operating conditions on the engine." *Id.* at [0016]. Accordingly, Kern is concerned with diesel fuel operation of the engine 12 while adjusting flow of gaseous fuel to account for operating conditions of the generator, with engine 12 operable with "bi-fuel controller 23 [that] continually monitors the various sensors for generator set 10." *Id.* at ¶ [0039]; FIG. 1. In contrast, Graf is concerned with "vehicles with engines designed to use gasoline as their primary fuel wherein an alternate fuel system can be added to enable use of an alternate fuel by switching back and forth between gasoline and the alternate fuel." *Graf*, Col. 1, lns. 5-11. Accordingly, Graf has not been shown to disclose the simultaneous liquid fuel and gaseous fuel engine operation or an engine operable with bi-fuel controller 23/sensors of Kern. Therefore, the generator set 10 of Kern will <u>not</u> control gaseous fuel supplementation to diesel fuel operation according to predetermined operating conditions if substituted with the engine

Champion - EX2092, Page 92 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

of Graf, and would thus change the principle operation of Kern. As stated in MPEP §2143.01(VI), "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." (citing *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)).

Further, the Examiner's proposed combination of Kern and Graf would not be obvious since Kern discloses "a method of controlling and regulating operation of a bi-fuel, engine-driven electrical generator set." *Kern*, ¶ [0001]. That is, Kern discloses, "[t]he flow of diesel fuel to the cylinders of engine 12 is controlled by governor 13." *Id.* at ¶ [0028]. Regarding natural gas supply 18, Kern discloses "Gas cut off valve 25 opens and closes the first flow path 18 in response to instructions received from bi-fuel controller 23." *Id.* at ¶ [0029]. Accordingly, Kern discloses that governor 13 controls liquid fuel to the engine 12 while gas cut off valve 25 controls gaseous fuel to the engine 12. Since Kern discloses a bi-fuel system configured to control liquid fuel delivery and to control gaseous fuel delivery to engine 12, one skilled in the art would not have been motivated to replace the engine 12 of Kern with another engine having the dual fuel system of Graf absent improper hindsight reasoning with the present Application as a roadmap. As stated in the MPEP, in arriving at a conclusion of obviousness, "impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art." MPEP § 2142. Therefore, combining Kern and Graf to arrive at a multi-fuel generator and fuel delivery system including the electro-mechanical valve system or the fuel regulator system including a primary pressure regulator and a secondary pressure regulator of claim 13 would not be obvious to one of ordinary skill in the art.

As stated above, 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. 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. Also, it would not have been obvious to one of ordinary skill in the art to combine Kern and Graf to arrive at the subject matter of claim 13. Therefore,

Champion - EX2092, Page 93 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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. Appellant therefore respectfully requests reversal of the rejection of claim 13 and of all claims dependent therefrom.

Claim 14

The Examiner rejected dependent claim 14 under 35 U.S.C. §103 as being unpatentable over Kern in view of Graf. In support of the rejection to claim 14, the Examiner stated that "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." *Final Office Action*, p. 9. Appellant respectfully disagrees with the rejections.

Claim 14 calls for, in part, an electro-mechanical valve system is configured to switch operation of a generator from multiple fuel sources while the generator is running.

In setting forth the rejection of claim 14, the Examiner relied upon Graf as disclosing a "switch 51" to assert that Graf discloses an "electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running." *Final Office Action*, p. 9. However, Graf in fact does not disclose a "switch 51," nor does Graf disclose any element having item number "51". *Graf*, FIG. 1. For this reason alone, the reject is deficient and must be reversed. Still further, neither Graf nor Kern, nor a combination thereof, teaches or suggests an electro-mechanical valve system is configured to switch operation of a generator from multiple fuel sources while the generator is running, as called for in claim 14. Accordingly, claim 14 is patentably distinct from the art of record and Appellant requests reversal of the rejection thereof under 35 U.S.C. §103.

Rejection under 35 U.S.C. §103 - Kern et al. (US Pub. 2004/0139943 - "Kern") and Poehlman (USP 4,489,699 - "Poehlman")

Claim 16

The Examiner rejected dependent claim 16 under 35 U.S.C. §103 as being unpatentable over Kern in view of Poehlman. In rejecting the claim, the Examiner stated:

Champion - EX2092, Page 94 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

> 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.

Final Office Action, p. 11. Appellant respectfully disagrees with the rejection.

Claim 16 calls for, in part, a multi-fuel generator and fuel delivery system including an electro-mechanical valve system having a carburetor cutoff solenoid coupled to a carburetor to control liquid fuel flow to an engine, and a gaseous fuel cutoff solenoid coupled to a gaseous fuel line to control flow of the gaseous fuel to the engine.

By dependency on claim 13, claim 16 further calls for, in part, a fuel regulator system comprising a primary pressure regulator coupled to a service valve of a 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 an alternator, a battery, and a magneto that controls fuel flow to the engine from a liquid fuel source and the pressurized fuel source.

Contrary to the Examiner's statement, Poehlman does not disclose "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." *Quoting Final Office Action*, p. 11. Initially, Poehlman does not disclose an "ECM 10" as relied upon by the Examiner as part of a carburetor cutoff solenoid. *Poehlman*, FIGS. 1-5. Further, as stated above with respect to claims 1 and 20, Poehlman does <u>not</u> disclose that gaseous fuel control valve 45 comprises a solenoid, and therefore does <u>not</u> disclose the gaseous fuel cutoff

Champion - EX2092, Page 95 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

solenoid of claim 16. Further, the Examiner has not asserted that either of Kern or Poehlman teach or suggest the electro-mechanical valve system or the fuel regulator system comprising a primary pressure regulator and a secondary pressure regulator, as called for in claim 16 by dependency on claim 13. *See Final Office Action*, p. 11.

Accordingly, neither Kern, Poehlman, nor a combination thereof, has been shown to teach, suggest, or disclose that which is called for in claim 16. Therefore, Appellant respectfully requests that the rejection of claim 16 be withdrawn, along with the rejection of all claims dependent therefrom.

5. CONCLUSION

For at least the reasons set forth above, that which is called for in claims 1, 13, and 20 is not taught or suggested in the art of record or a combination thereof.

As such, Appellant believes that claims 1, 13, and 20, and claims which depend therefrom, are patentably distinct over the art of record.

Appellant appreciates the Board's consideration of these Remarks and respectfully requests timely issuance of a Notice of Allowance.

Respectfully submitted,

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Champion - EX2092, Page 96 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

CLAIMS APPENDIX

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.

Champion - EX2092, Page 97 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

5. (Previously Presented) The multi-fuel engine of claim 1 wherein the 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. (Previously Presented) 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 a second gaseous fuel from a second gaseous fuel source; and

further comprising a second gaseous cutoff solenoid coupling the engine to 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.

Champion - EX2092, Page 98 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Champion - EX2092, Page 99 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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

Champion - EX2092, Page 100 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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:

Champion - EX2092, Page 101 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Champion - EX2092, Page 102 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

EVIDENCE APPENDIX:

APPENDIX A

Champion - EX2092, Page 103 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

RELATED PROCEEDINGS APPENDIX:

-- None --

Champion - EX2092, Page 104 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121



solenoid noun

so·le·noid | \ ˈsō-lə-ˌnȯid , ˈsä-\

Definition of *solenoid*

: a coil of wire usually in cylindrical form that when carrying a current acts like a magnet so that a movable core is drawn into the coil when a current flows and that is used especially as a switch or control for a mechanical device (such as a valve)

Electronic Acknowledgement Receipt

EFS ID:	34293885
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:	13-NOV-2018
Filing Date:	04-OCT-2016
Time Stamp:	14:50:49
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	Appeal Brief Filed	AppealBrief.pdf	387463 9311d9470371d2ae3d60b8f9953c1a40d7877d1f	no	38

Warnings:

Information:	
Total Files Size (in bytes):	387463

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.

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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.

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.

PTO/AIA/31 (03-14)
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NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD

Docket Number (Optional)
CET1090.044

I hereby certify that this correspondence is being facsimile transmitted to the USPTO, EFS-Web transmitted to the USPTO, or deposited with the United States Postal Service with sufficient postage in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

On September 10, 2018

Signature /Robyn L. Templin/

Typed or printed name Robyn L. Templin

In re Application of
Collie et al.

Application Number	Filed
15/285,215	10/4/2016

For FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

Art Unit	Examiner
3747	Long Tran

Applicant hereby **appeals** to the Patent Trial and Appeal Board from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 800.00

[X] Applicant asserts small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by 50%, and the resulting fee is: $ 400.00

[ ] Applicant certifies micro entity status. See 37 CFR 1.29. Therefore, the fee shown above is reduced by 75%, and the resulting fee is: $ _____
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

[ ] A check in the amount of the fee is enclosed.

[ ] Payment by credit card. Form PTO-2038 is attached.

[ ] The Director is hereby authorized to charge any fees which may be required, or credit any overpayment To Deposit Account No. _____.

[X] Payment made via EFS-Web.

[ ] A petition for an extension of time under 37 CFR 1.136(a) (PTO/AIA/22 or equivalent) is enclosed.
For extensions of time in reexamination proceedings, see 37 CFR 1.550.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant

[X] attorney or agent of record
Registration number 55584

[ ] attorney or agent acting under 37 CFR 1.34
Registration number _____.

Signature /Kevin R. Rosin/

Typed or printed name Kevin R. Rosin

Telephone number (262) 268-8100

Date September 10, 2018

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

[X] * Total of 1 forms are submitted.

This collection of information is required by 37 CFR 41.20(b)(1) and 41.31. 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, 1.14 and 41.6. This collection is estimated to take 12 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 `450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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:	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:				
NOTICE OF APPEAL	2401	1	400	400
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**400**

Electronic Acknowledgement Receipt

EFS ID:	33668017
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:	10-SEP-2018
Filing Date:	04-OCT-2016
Time Stamp:	11:16:26
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Payment was successfully received in RAM	$400
RAM confirmation Number	091018INTEFSW11170300
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	Notice of Appeal Filed	NoticeOfAppeal.pdf	112741 b12a2c6caa1406950626351e4b350510a95788b1	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30453 da3e452aff5e755000af5685ed2a55e3dfd7525f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	143194		

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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.

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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 08/16/2018
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
08/16/2018	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

Advisory Action Before the Filing of an Appeal Brief	**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 --

THE REPLY FILED 03 August 2018 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☐ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires *3* months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): (a) ☒ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☒ Other: PTO-2323.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed: .
    Claim(s) objected to: 8-12.
    Claim(s) rejected: 1-7,13-26.
    Claim(s) withdrawn from consideration: .

/LONG T TRAN/
Primary Examiner, Art Unit 3747

Champion - EX2092, Page 114 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Continuation of 12. does NOT place the application in condition for allowance because: The new limitation changes the scope of the invention and adds a limitation not previosly considered within the requirements of the search. This would produce a serious search burden on the exmainer.

AFCP 2.0 Decision	Application No.	Applicant(s)
	15/285,215	COLLIE ET AL.
	Examiner	Art Unit
	LONG T. TRAN	3747

This is in response to the After Final Consideration Pilot request filed 03 August 2018.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ A proper AFCP 2.0 request was submitted in response to the most recent final rejection.

   ☐ Other:

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☒ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☐ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action. See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☐ 5. Other:

   Examiner Note: Please attach an interview summary when necessary as described above.

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
CET1090.044	15/285,215	October 4, 2016
First Named Inventor:	**Title:**	
Kendall J. Collie	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
   - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
   - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
     - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
     - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
       - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
       - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/Kevin R. Rosin/	August 3, 2018
Name (Print/Typed) Kevin R. Rosin	Practitioner Registration No. 55584

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☑ * Total of 1 forms are submitted.

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 disclosure of these records is required by the Freedom of Information Act.
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 inspection 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.

REMARKS

Claims 1-26 are pending in the present application. In the Final Office Action mailed June 8, 2018, the Examiner rejected claims 1-7 and 20-25 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman (USP 4,489,699). The Examiner next rejected claims 13-15, 18, and 19 under 35 U.S.C. §103 as being unpatentable over Kern et al. (US Pub. 2004/0139943 – hereinafter "Kern") 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 in view of Poehlman. Claim 26 was rejected under 35 U.S.C. §103 as being unpatentable over Poehlman in view of Kern and Graf.

Claims 8-12 were indicated as containing allowable subject matter. Such indication is appreciated.

Response under AFCP 2.0

Without acquiescing to the rejections, Applicant has elected to amend independent claim 1 in order to further clarify the scope of the invention, with amendments and arguments presented here below for consideration under the After Final Consideration Pilot 2.0.

Claim 1 has been amended herein to include that the switch is programmed to institute a predefined time interval between actuating the liquid cutoff solenoid and the gaseous cutoff solenoid. Support for the amendment can be found in at least Paragraph [0034], [0037], [0039], [0041], [0047]-[0048] of the Specification, FIGS. 2-3, and in Claim 23. No new matter is added by way of the amendment.

Introductory Remarks re Finality

The Examiner made final the Office Action mailed on June 8, 2018. *Final Office Action*, 06/08/2018. Applicant respectfully disagrees with the finality of the Office Action and requests that the finality of the Office Action be withdrawn. The issues are not ripe for appeal because the Examiner did not consider patentability arguments to independent claim 13 in Applicant's previous response filed on May 2, 2018. "Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it." *MPEP §707.07(f)*. In the Final Office Action, the Examiner repeated the rejection to independent claim 13 but did not "take note" or "answer the substance" of Applicant's May 2, 2018 arguments, as detailed below with respect to claim 13. Therefore, the Final Office Action is deficient because the requirements of MPEP §707.07(f) have not been satisfied. "If, on request by applicant for reconsideration, the primary examiner finds the final

Champion - EX2092, Page 119 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

rejection to have been premature, he or she should withdraw the finality of the rejection." *MPEP §706.07(d)*. Accordingly, the finality of the Office Action mailed on June 8, 2018 is premature and Applicant respectfully requests reconsideration and withdrawal thereof.

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

Claim 1

The Examiner rejected independent claim 1 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. Without acquiescing to the rejection, Applicant has elected to amend claim 1 herein.

Amended claim 1 calls for a multi-fuel engine including 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, the switch being programmed to institute a predefined time interval between actuating the liquid cutoff solenoid and the gaseous cutoff solenoid.

Applicant believes claim 1 is patentably distinct over that which is disclosed in Poehlman, at least for the reasons that Poehlman cannot be said to teach or suggest a switch being programmed to institute a predefined time interval between actuating a liquid cutoff solenoid and a gaseous cutoff solenoid, as called for in claim 1.

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.

Champion - EX2092, Page 120 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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. However, the engine continues to run on the liquid

Champion - EX2092, Page 121 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

fuel in the carburetor bowl 17. *Poehlman*, Col. 6, lns. 25-27. Once the engine begins to run out of the liquid fuel in the fuel bowl 17, the inlet manifold vacuum then drops to an amount less than or below the predetermined level thereby closing the vacuum switch 47 which energizes the solenoid coils 81 and 83. *Poehlman*, Col. 6, lns. 27-33. The first solenoid coil 81 acts to displace the first switch member 65 to the terminal 63, thereby energizing the gaseous fuel control valve 45 to the open position. *Poehlman*, Col. 6, lns. 33-36.

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 *[sic]* to the open position and the carburetor bowl 17 begins to fill. *Poehlman*, Col. 6, lns. 45-47. The gaseous fuel control valve 45 is retained open until the engine 13 begins to run on both fuels. *Poehlman*, Col. 6, lns. 49-55. The vacuum condition at the vacuum switch 47 then drops below the predetermined level, thereby closing the vacuum switch 47, which closure energizes the second solenoid coil 83. *Poehlman*, Col. 6, lns. 55-59. The second solenoid coil 83 shifts the second switch member 79 to the holding terminal 77 deenergizing and closing the gaseous fuel control valve 45. *Poehlman*, Col. 6, lns. 59-62.

However, there is no disclosure provided in Poehlman of a switch that 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, the switch being programmed to institute a predefined time interval between actuating the liquid cutoff solenoid and the gaseous cutoff solenoid, as called for in claim 1. Instead, Poehlman discloses the vacuum switch 47 actuates the gaseous fuel control valve 45 after inlet manifold vacuum drops below a predetermined level. In opening the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the engine 13 begins to run out of liquid fuel in the fuel bowl 17. In closing the gaseous fuel control valve 45, the vacuum conditions drop below the predetermined level after the fuel bowl 17 fills and the engine 13 begins to run on both fuels. Thus, the vacuum switch 47 actuates the gaseous fuel control valve 45 based on inlet manifold vacuum conditions caused by deficient/excess fuel flow therein rather than based upon a predefined time interval. Since the gaseous fuel control valve 45 is <u>not</u> actuated based on a predefined time interval, selector switch 51 is <u>not</u> programmed to institute a predefined time interval between actuating a liquid cutoff solenoid and a gaseous cutoff solenoid, as would be required to anticipate claim 1.

Accordingly, Poehlman does not teach or suggest each and every element of claim 1. Therefore, Applicant believes claim 1 is patentably distinct from Poehlman and respectfully requests withdrawal of the rejection of claim 1, and the claims depending therefrom.

Champion - EX2092, Page 122 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Claim 20

The Examiner rejected independent claim 20 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman. In rejecting claim 20, the Examiner asserted (in part) that Poehlman discloses:

> 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.

Final Office Action, p. 4-5. Applicant respectfully disagrees with the rejection.

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

Champion - EX2092, Page 123 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Claim 20 calls for a multi-fuel internal combustion engine including 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.

Contrary to the Examiner's assertion, Poehlman does <u>not</u> disclose "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." *Quoting Final Office Action*, p. 5. Instead, an as set forth with respect to claim 1, Poehlman discloses the fuel selector switch 51 is moved to the gaseous fuel position resulting in the liquid fuel control valve 43 being deenergized turning off the liquid fuel supply to the carburetor 15. *Poehlman*, Col. 6, lns. 21-25. However, the engine 13 continues to run on only liquid fuel until the engine begins to run out of the liquid fuel in the fuel bowl 17. *Poehlman*, Col. 6, lns. 25-36. Accordingly, engine 13 operation on gaseous fuel is <u>*not*</u> engaged before the fuel bowl 17 begins to run out of liquid fuel. "The vacuum then drops to an amount less than or below the predetermined level thereby closing the vacuum switch 47 which energizes the solenoid coils 81 and 83." *Poehlman*, Col. 6, lns. 30-33. "The first solenoid coil 81 acts to displace the first switch member 65 to the terminal 63, thereby energizing the gaseous fuel control valve 45 to the open position." *Poehlman*, Col. 6, lns. 33-36. Thus, the gaseous fuel control valve 45 is energized to the open position only after the fuel bowl 17 begins to run out of liquid fuel rather than by actuation of the selector switch 51.

More particularly, engine 13 operation on gaseous fuel is engaged by vacuum switch 47 energizing the first solenoid coil 81 to displace first switch member 65 energizing gaseous fuel control valve 45. *Poehlman*, Col. 6, lns. 30-36. However, the vacuum switch 47 operates when inlet manifold vacuum drops below a predetermined level and therefore operates independently of selector switch 51. That is, the gaseous fuel control valve 45 operates via vacuum switch 47

Champion - EX2092, Page 124 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

when the inlet manifold vacuum drops to an amount less than or below a predetermined level instead of by actuation of selector switch 51. Since the gaseous fuel control valve 45 is operated by the vacuum switch 47 independently from the selector switch 51, the Examiner has not shown that the gaseous fuel control valve 45 opens *upon actuation of the selector switch 51 from liquid fuel to gaseous fuel*.

Accordingly, Poehlman has not been shown to teach or suggest 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, as called for in claim 20. Accordingly, Applicant believes claim 20 is patentably distinct from Poehlman and respectfully requests withdrawal of the rejection of claim 20, and the claims depending therefrom.

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

Claim 13

The Examiner rejected independent claim 13 under 35 U.S.C. §103 as being unpatentable over Kern in view of Graf. The Examiner repeated the rejection to claim 13 from the previous Office Action issued Feb. 2, 2018. In rejecting the claim, the Examiner asserted that Kern teaches the 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.

Final Office Action, p 7-8. *See also Office Action*, 02/02/2018, p. 7-8. In the Response to Arguments section of the Final Office Action, the Examiner stated:

> In response to applicant's arguments against the references individually on page 14 of the Remarks, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller,* 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Final Office Action, p. 14. Applicant respectfully disagrees with the rejection.

In the Final Office Action, the Examiner repeated the rejection to claim 13 but did not "take note" or "answer the substance" of Applicant's May 2, 2018 arguments, as required by MPEP §707.07(f), other than to assert that the Applicant argued against the Kern and Graf references individually. *Final Office Action*, p. 14. MPEP §707.07(f) states, "[w]here the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note

Champion - EX2092, Page 125 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

of the applicant's argument and answer the substance of it." Therefore, the Final Office Action is deficient because the requirements of MPEP §707.07(f) have not been satisfied, where the Examiner failed to address Applicant's arguments in the May 2, 2018 Response that the combination of Kern and Graf fails to teach or suggest that which is called for in claim 13, repeated herein below. Thus, the finality of the present Office Action is improper, and the Office Action should be treated as Non-Final. *See MPEP §706.07.*

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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 4-6. 44-47. Pressure of the alternate fuel is 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, lns. 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, lns. 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, lns. 55-59. The main branch of alternate fuel supply line 4 leads to primary port 28 of pilot control valve 29. *Graf*, Col. 4, lns. 60-61. The

Champion - EX2092, Page 126 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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, lns. 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.

Champion - EX2092, Page 127 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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 Graft 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 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.

Champion - EX2092, Page 128 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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,

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Dated: August 3, 2018
Attorney Docket No.: CET1090.044

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Champion - EX2092, Page 129 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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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Champion - EX2092, Page 130 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

In the Claims

1. (Currently Amended) 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, the switch being programmed to institute a predefined time interval between actuating the liquid cutoff solenoid and the gaseous cutoff solenoid.

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

Champion - EX2092, Page 131 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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. (Previously Presented) 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 a second gaseous fuel from a second gaseous fuel source; and

further comprising a second gaseous cutoff solenoid coupling the engine to 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.

Champion - EX2092, Page 132 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Champion - EX2092, Page 133 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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

Champion - EX2092, Page 134 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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.

Champion - EX2092, Page 135 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Customer No. 26629 Patent
Confirmation No. 2429 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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37 CFR 1.8(a) **37 CFR 1.10**

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□ transmitted by facsimile to Fax No.: 571-273-8300 addressed to **Examiner Long T Tran** at the Patent and Trademark Office.

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Date: August 3, 2018 /Robyn L. Templin/
Signature

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

AFTER-FINAL
AMENDMENT/RESPONSE TO FINAL OFFICE ACTION
MAILED JUNE 8, 2018

Dear Sir:

Responsive to the Final Office Action mailed June 8, 2018, please amend the Application as follows and consider the following remarks:

Electronic Acknowledgement Receipt

EFS ID:	33374208
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:	03-AUG-2018
Filing Date:	04-OCT-2016
Time Stamp:	17:33:17
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	After Final Consideration Program Request	AfterFinalConsiderationRequest.pdf	227685 8d8517b2c025ca24fe875010776b4dbe63951dcd	no	2

Warnings:

Champion - EX2092, Page 137 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Information:					
2		Response.pdf	204187 670f7f692c849e234113adc765019f8e1cdfe6cb	yes	18

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Applicant Arguments/Remarks Made in an Amendment	7	18
Claims	2	6
Response After Final Action	1	1

Warnings:	
Information:	
Total Files Size (in bytes):	431872

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.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
15/285,215	10/04/2016	

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) 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), (i), 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 $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ 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

AMENDMENT **08/03/2018**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) 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

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ 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.
** 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 number found in the appropriate box in column 1.

LIE
LASHAWN MORGAN

This collection of information is required by 37 CFR 1.16. 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 12 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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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 06/08/2018

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EXAMINER
TRAN, LONG T

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
06/08/2018	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

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- 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 *2 May 2018*.

☐ 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) *1-7 and 13-26* is/are rejected.

8)☒ Claim(s) *8-12* 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 _____ 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)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *see attached*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Champion - EX2092, Page 141 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

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. The Amendment filed May 2, 2018 has been entered. No new matter has been added.

3. The previous 35 USC 112 Rejection has been withdrawn in light of the Amendment.

4. Claims 1 - 26 remain pending in the application.

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 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:

Peohlman 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 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.

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 Poelhman 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 Poelhman 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.

Allowable Subject Matter

15. Claims 8 - 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

16. Applicant's arguments filed May 2, 2018 have been fully considered but they are not persuasive.

On Page 8 of the Remarks, the Applicant argues that Poehlman does not teach a liquid cutoff solenoid as claimed. The Examiner disagrees and maintains the rejection because a broad but reasonable interpretation of a "liquid cutoff" is understood by the Examiner as any kind of valve-like structure that controls the flow of fuel. In addition, a "solenoid valve" is understood by the Examiner to encompass any valve with electric actuation (see Wikipedia and general searches on solenoid type valves). Poehlman clearly teaches control means 41 selectively opens and closes valve 43 in response to electrical energization (Col 3 line 63 to Col 4 line 2), thus meeting the broad but reasonable interpretation of a solenoid valve.

Subsequent arguments in the Remarks pertain to the same issue with the Examiner's rejection of the liquid cutoff solenoid, and the same response is applied.

In response to applicant's arguments against the references individually on page 14 of the Remarks, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

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

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

19. 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.

/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.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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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

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
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	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]
/L.T.T/	1	1981121	CN	A	2007-06-13	Honda Motor Co., Ltd.		

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NON-PATENT LITERATURE DOCUMENTS Remove

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]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.T.T/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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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

	1		

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EXAMINER SIGNATURE

Examiner Signature	/LONG T TRAN/	Date Considered	06/03/2018

*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	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-06-01
Name/Print	Kevin R. Rosin	Registration Number	55584

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.**

Privacy Act Statement

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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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 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
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	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]
/L.T.T/	1	2060477	CN	U	1990-08-15	Zhao Yunying		

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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]

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Examiner Name	Long T. Tran
Attorney Docket Number	CET1090.044

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Examiner Signature	/LONG T TRAN/	Date Considered	06/03/2018

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[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.

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Art Unit	3747
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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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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	106	engine and ((gasoline liquid first second) near3 fuel same valve) and ((gas$4 lpg ng (natural adj gas)) near5 fuel same valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4) near5 fuel) and (float near2 (chamber bowl) and (carburetor carburettor)) and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/06/03 15:01
L3	181	engine and ((gasoline liquid first second) near3 fuel same valve) and ((gas$4 lpg ng (natural adj gas)) near5 fuel same valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4 transition$4 between) near5 fuel) and (float near2 (chamber bowl) and (carburetor carburettor)) and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/06/03 15:03
L4	68	engine and ((gasoline liquid first second) near3 fuel same valve) and ((gas$4 lpg ng (natural adj gas)) near5 fuel same valve) and ((carburetor carburretor) same intake) and ((switch$4 chang$4 transition$4 between) near5 fuel) and (float$3 same (carburetor carburettor)) and gasoline and solenoid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/06/03 15:04

6/3/2018 3:05:36 PM
C:\Users\ltran2\Documents\EAST\Workspaces\15285215.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15285215	COLLIE ET AL.
	Examiner	Art Unit
	LONG T TRAN	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	06/03/2018							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	O							
	9	✓	O							
	10	✓	O							
	11	✓	O							
	12	✓	O							
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	21	✓	✓							
	22	✓	✓							
	23	✓	✓							
	24	✓	✓							
	25	✓	✓							
	26	✓	✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15285215	COLLIE ET AL.
	Examiner	Art Unit
	LONG T TRAN	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
Updated text search	6/3/2018	LT

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

Champion - EX2092, Page 168 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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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

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
/L.T.T/	1	3384059		1968-05-21	Kopa	
/L.T.T/	2	3412258		1968-11-19	Satter	
/L.T.T/	3	3659574		1972-05-02	Reschke et al.	
/L.T.T/	4	3888223		1975-06-10	Mondt	
/L.T.T/	5	4335697		1982-06-22	McLean	
/L.T.T/	6	4373493		1983-02-15	Welsh	
/L.T.T/	7	4463735		1984-08-07	Stoltman	
/L.T.T/	8	4480595		1984-11-06	Hobby et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.T.T/

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/L.T.T/	9	4628871		1986-12-16	Glass	
/L.T.T/	10	4708094		1987-11-24	Helmich et al.	
/L.T.T/	11	4979480		1990-12-25	Daikoku et al.	
/L.T.T/	12	5092305		1992-03-03	King	
/L.T.T/	13	5228423		1993-07-20	Oikawa et al.	
/L.T.T/	14	9435273	B2	2016-09-06	Sarder 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
/L.T.T/	1	20070137591	A1	2007-06-21	Sugimoto et al.	
/L.T.T/	2	20110168133	A1	2011-07-14	Pursifull et al.	
/L.T.T/	3	20140202430	A1	2014-07-24	Monros	

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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]
/L.T.T/	1	Champion Power (2014, Dec. & Jan.) 100153 Manual, Retrieved from http://www.championpowerequipment.com/media/2400/100153_manual-english_12-4-14.pdf	

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EXAMINER SIGNATURE

Examiner Signature	/LONG T TRAN/	Date Considered	06/03/2018

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

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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.

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(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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	Application Number	15285215
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	Art Unit	3747
	Examiner Name	Long T. Tran
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[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	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-06-01
Name/Print	Kevin R. Rosin	Registration Number	55584

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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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.

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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.

Customer No. 26629 Patent
Confirmation No. 2429 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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INFORMATION DISCLOSURE STATEMENT
CERTIFICATION STATEMENT UNDER 37 CFR 1.704(D)(1)

Dear Sir:

Each item of information contained in this information disclosure statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by an individual designated under 37 CFR 1.56(c) more than thirty (30) days prior to the filing of this information disclosure statement.

Dated: June 1, 2018
Attorney Docket No.: CET1090.044

Respectfully submitted,

/Kevin R. Rosin/

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Espacenet

Bibliographic data: CN1981121 (A) — 2007-06-13

Engine generator

Inventor(s): KATSUHIRO SUGIMOTO YASUHIRO KO [JP] ± (SUGIMOTO YASUHIRO,KOJIMA HIROAKI,TAKEMURA KAZUHITO,NAKAGAWA KATSUHIRO, ; SUGIMOTO YASUHIRO, ; KOJIMA HIROAKI, ; TAKEMURA KAZUHITO, ; NAKAGAWA KATSUHIRO)

Applicant(s): HONDA MOTOR CO LTD [JP] ± (HONDA MOTOR CO., LTD, ; HONDA GIKEN KOGYO K. K)

Classification: **- international:** ***F01P5/06; F02B63/04; F02M21/02; F02M21/06***
- cooperative: **F02B43/00**; **F02B63/04**; **F02D19/022**; **F02D19/027**; **F02D19/0615**; **F02D19/0647**; **F02D19/0676**; **F02D29/06**; **F02M21/0224**; **F02M21/0287**; **F02M21/029**; **F02M21/06**; F01P5/06; F01P9/02; F02B63/044; F02M21/047; Y02T10/32; Y02T10/36

Application number: CN2005822860 20050920

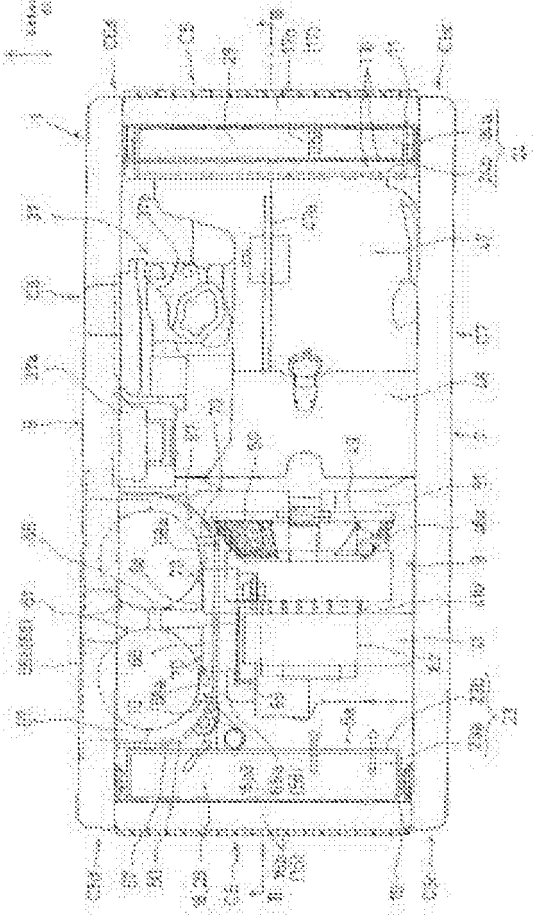
Priority number(s): JP20040285036 20040929

Also published as: CN100510347 (C) DE05785589 (T1) DE602005003347 (T2) EP1744030 (A1) EP1744030 (A4) more

Abstract of CN1981121 (A)

An engine generator (1), comprising an engine (30), a generator (40) driven by the engine (30), and a power control unit (41) controlling a power generated by the generator (40). A gas fuel stored, in a liquefied state, in cassette cylinders (61) stored in the case (C) of the engine generator (1) is supplied to the engine (30) through a fuel pressure regulator (62). The cassette cylinders (61) and the fuel pressure regulator (62) are disposed in proximity to the power control unit (41) so that the heat exchange thereof with the power control unit (41) with an inverter can be performed. As a result, heat can be mutually utilized between at least one of the cassette cylinders (61) as fuel containers and the fuel pressure regulator (62) and the power control unit (41) in the engine generator (1).

Fig.4



[19] 中华人民共和国国家知识产权局

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[86] 国际申请 PCT/JP2005/017294 2005.9.20
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[85] 进入国家阶段日期 2007.1.5
[71] 申请人 本田技研工业株式会社
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[72] 发明人 杉本康弘 小崎洋明 竹村一仁 中川胜博

[74] 专利代理机构 北京三友知识产权代理有限公司
代理人 陈 坚

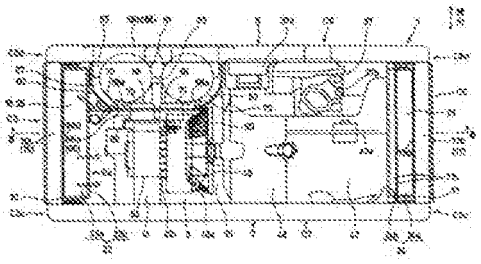
权利要求书 2 页 说明书 25 页 附图 10 页

[54] 发明名称

发动机发电机

[57] 摘要

本发明提供一种发动机发电机(1)，其具有：发动机(30)；发电机(40)，其由发动机(30)驱动；和电力控制单元(41)，其控制发电机(40)产生的电力。在容纳于发动机发电机(1)的箱体(C)内的盒式高压储气瓶(61)中，以液化状态储存有气体燃料，该气体燃料通过燃料压力调节器(62)而被供给发动机(30)。盒式高压储气瓶(61)和燃料压力调节器(62)接近电力控制单元(41)来进行配置，以便能够与具有变流器的电力控制单元(41)进行热交换。从而，在发动机发电机(1)中，在作为燃料容器的盒式高压储气瓶(61)和燃料压力调节器(62)中的至少一方与电力控制单元(41)之间，相互利用热量。



1．一种发动机发电机，该发动机发电机具有：燃料容器，其将气体燃料以液化状态储存；发动机，其被供给来自该燃料容器的气体燃料；燃料压力调节器，其调节从所述燃料容器供给到所述发动机的气体燃料的压力；发电机，其由所述发动机驱动；和电力控制单元，其控制所述发电机所产生的电力，所述发动机发电机的特征在于，

所述燃料容器和所述燃料压力调节器中的至少一方接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

2．如权利要求 1 所述的发动机发电机，其特征在于，

所述发动机发电机具有容纳所述燃料容器的容纳室；所述燃料容器与所述容纳室的室壁通过由热的良导体构成的传热部件进行热连接；所述室壁接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

3．如权利要求 2 所述的发动机发电机，其特征在于，

所述传热部件是以与所述燃料容器和所述容纳室的室壁相接触的方式介于所述传热部件与所述容纳室的室壁之间的多个柱状部件。

4．如权利要求 1 所述的发动机发电机，其特征在于，

所述燃料容器和所述燃料压力调节器中的至少一方与所述电力控制单元通过由热的良导体构成的传热部件进行热连接，或者直接进行热连接。

5．如权利要求 1 至 4 中任一项所述的发动机发电机，其特征在于，

所述电力控制单元具有变流器。

6．如权利要求 1 至 4 中任一项所述的发动机发电机，其特征在于，

所述发动机发电机具有箱体，所述箱体形成容纳所述燃料容器、所述发动机以及所述发电机的内部空间，

被导入所述内部空间的冷却风以顺次冷却所述燃料容器和所述电力控制单元后，冷却所述发电机和所述发动机的方式形成冷却风通路。

7．如权利要求 6 所述的发动机发电机，其特征在于，

相对于所述容纳室的室壁，在所述容纳室的相反侧，配置有所述燃料

Champion - EX2092, Page 182 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

压力调节器和所述电力控制单元，并且，所述电力控制单元位于所述燃料压力调节器的下侧。

8. 如权利要求 7 所述的发动机发电机，其特征在于，

所述箱体沿其一侧壁的上部具有空气导入口；所述燃料压力调节器设于所述空气导入口的下游。

发动机发电机

技术领域

本发明涉及一种发动机发电机，该发动机发电机具有发动机和由该发动机驱动的发电机，以液化状态储存在燃料容器中的气体燃料被供给所述发动机。

背景技术

发动机发电机被广泛用作室外的临时电源，或是紧急情况下的电源。而且，发动机发电机例如在用作休闲用品或防灾用品的情况下，大多使用以储存在小型燃料容器例如盒式高压储气瓶中的气体燃料来作为燃料的燃气发动机。

可是，气体燃料以液化状态储存在燃料容器中，当向燃气发动机供给时，是以气化的状态进行供给。因此，当燃气发动机运转从而开始向该发动机供给气体燃料时，在燃料容器中，由于为了维持液相和气相的平衡状态，伴随着气体压力的降低，液态的气体燃料气化，所以夺取了大量的气化热，使得燃料容器的温度降低。此外，即使在调节气体燃料压力的燃料压力调节器中，也会由于刚气化后的被冷却了的气体燃料的流入或气体燃料的减压而使其温度降低。

而且，当燃料容器等的温度过度降低时，由于气体燃料的气化变得不充分等而使压力降低，从而气体燃料的供给不能顺利进行。为了防止这样的状况，就要根据燃料容器的温度或气体压力来加热燃料容器，这已为大家所知（例如，参照专利文献1、2）。

另一方面，在发动机发电机中，对发电机所产生的电力进行控制的电力控制单元由于其动作引起的发热量很大，所以公知有各种用于冷却电力控制单元的结构。例如，在专利文献3中公开有这样的技术：发动机发电机具有隔音罩，该隔音罩中容纳有发动机、发电机和控制电路单元（相当

于电力控制单元），在该发动机发电机中，在收纳控制电路单元的箱体上设置散热翼片，该散热翼片面对着取入冷却风的进风口，并与形成有进风口的端壁抵接。

专利文献 1：日本国特开平 10-131810 号公报；

专利文献 2：日本国特许第 2671015 号公报；

专利文献 3：日本国实开昭 63-171632 号公报。

在通过加热器来对储存有气体燃料的燃料容器进行加热的情况下，存在要对加热器的设计方法或加热方法进行设计等的问题、以及结构和控制方法的复杂化所带来的问题。进一步讲，在通过冷却风来冷却电力控制单元的情况下，存在着电力控制单元及其周边部件的配置受到制约或结构复杂化所带来的问题。

发明内容

本发明是鉴于如上状况，着眼于伴随着发动机发电机的运转，以液化状态储存的气体燃料的燃料容器处于温度降低的倾向，而相反，电力控制单元却处于温度上升的倾向而完成的，本发明的主要目的在于，在发动机发电机中，在燃料容器和燃料压力调节器中的至少一方与电力控制单元之间，相互利用彼此的热。本发明的再一目的在于，能够高效地进行通过燃料容器对电力控制单元的冷却和通过电力控制单元对燃料容器的加热，以及增大燃料容器和电力控制单元的配置自由度。本发明的另一目的在于，进一步提高燃料容器和燃料压力调节器中的至少一方对电力控制单元的冷却效果、以及电力控制单元对燃料容器和燃料压力调节器中的至少一方的加热效果；提高冷却风对电力控制单元、发电机以及发动机的冷却效果；在对切换损失大且发热量大的变流器进行冷却的同时，利用电力控制单元的变流器的热量来高效地加热燃料容器和燃料压力调节器中的至少一方。

为达成上述目的，本发明的发动机发电机具有：燃料容器，其将气体燃料以液化状态储存；发动机，其被供给来自该燃料容器的气体燃料；燃料压力调节器，其调节从所述燃料容器供给到所述发动机的气体燃料的压力；发电机，其由所述发动机驱动；和电力控制单元，其控制所述发电机

Champion - EX2092, Page 185 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

所产生的电力，所述发动机发电机的特征在于，所述燃料容器和所述燃料压力调节器中的至少一方接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

根据这样的结构，由于在发动机发电机的运转中，通过燃料的气化等而成为低温的燃料容器和燃料压力调节器中的至少一方接近配置在可与电力控制单元进行热交换的位置，所以，从电力控制单元的散热量增加，换言之，通过燃料容器和燃料压力调节器中的至少一方促进了电力控制单元的冷却，从而抑制了电力控制单元的温度上升。同时，燃料容器和燃料压力调节器中的至少一方被电力控制单元加热，从而抑制了其温度降低。

在本发明的发动机发电机中，也可采用这样的结构，即：所述发动机发电机具有容纳所述燃料容器的容纳室；所述燃料容器与所述容纳室的室壁通过由热的良导体构成的传热部件进行热连接；所述室壁接近所述电力控制单元来进行配置，以便能够与所述电力控制单元进行热交换。

根据这样的结构，由于燃料容器中的从电力控制单元的受热，以及电力控制单元的散热都通过燃料容器的能传递热量的室壁进行，所以，为了在燃料容器与电力控制单元之间进行热交换，燃料容器和电力控制单元的配置就很少受到制约。此外，通过加大室壁或使室壁接近电力控制单元等的室壁的形状或配置，能够增加燃料容器与电力控制单元之间的传热量，从而能够提高燃料容器和电力控制单元相互之间的热利用率。

优选所述电热部件是以与所述燃料容器和所述容纳室的室壁相接触的方式介于所述传热部件与所述容纳室的室壁之间的多个柱状部件。

在本发明的发动机发电机中，所述燃料容器和所述燃料压力调节器中的至少一方与所述电力控制单元通过由热的良导体构成的传热部件进行热连接，或者直接进行热连接。

根据这样的结构，燃料容器和燃料压力调节器中的至少一方与电力控制单元之间的传热通过传热部件利用热传导进行，因此，能够进一步提高相互之间的热的利用率。

所述电力控制单元可以具有变流器。

根据这样的结构，由于变流器的切换损失大，发热量大，所以，通过

Champion - EX2092, Page 186 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

其动作而成为高温的变流器被燃料容器和燃料压力调节器中的至少一方高效地冷却，从而抑制了其温度上升；燃料容器和燃料压力调节器中的至少一方被高温的变流器高效地加热，从而抑制了其温度降低。

优选所述发动机发电机具有箱体，所述箱体形成容纳所述燃料容器、所述发动机以及所述发电机的内部空间；被导入所述内部空间的冷却风以顺次冷却所述燃料容器和所述电力控制单元后，冷却所述发电机和所述发动机的方式形成冷却风通路。

根据这样的结构，被导入箱体内部空间的冷却风被燃料容器冷却而成为更低的温度，该成为低温的冷却风首先冷却电力控制单元，然后冷却发电机和发动机。此外，电力控制单元通过与燃料容器和燃料压力调节器中的至少一方进行热的相互利用，与不进行热的相互利用的情况相比，由于成为低温，所以比冷却电力控制单元后的冷却风的温度还低。

优选采用这样的结构：相对于所述容纳室的室壁，在所述容纳室的相反侧，配置有所述燃料压力调节器和所述电力控制单元，并且，所述电力控制单元位于所述燃料压力调节器的下侧。

此外，可以使所述箱体沿其一侧壁的上部具有空气导入口；所述燃料压力调节器设于所述空气导入口的下游。

发明效果

根据本发明，可以达到如下的效果。即，通过在燃料容器和燃料压力调节器中的至少一方与电力控制单元之间相互利用彼此的热，来抑制电力控制单元的温度上升，因此，能够使电力控制单元的散热结构小型化；此外，由于抑制燃料容器和燃料压力调节器中的至少一方的温度降低，所以，或者可以不需要加热装置来加热燃料容器或燃料压力调节器，或者可以使加热装置的加热量减少，从而能够利用较低温度的加热源等，增加了加热源的选择项，此外，在加热源是电加热器的情况下，能够使其消耗电力减少。

根据本发明的优选实施方式，除了上述效果，还可达成如下的效果。即，通过室壁使燃料容器和电力控制单元的热被相互利用，在此基础上，使燃料容器和电力控制单元的配置自由度变大，此外，可以提高燃料容器

Champion - EX2092, Page 187 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

和电力控制单元相互之间的热的利用率，从而能够进一步高效地进行燃料容器对电力控制单元的冷却，以及电力控制单元对燃料容器的加热。

在本发明的实施方式中，还可进一步达成如下的效果。即，由于可以进一步提高燃料容器和燃料压力调节器中的至少一方与电力控制单元的相互之间的热的利用率，所以能够进一步提高燃料容器和燃料压力调节器中的至少一方对电力控制单元的冷却效果，以及电力控制单元对燃料容器和燃料压力调节器中的至少一方的加热效果。

在本发明的实施方式中，还可进一步达成如下的效果。即，通过温度更低的冷却风能够更高效地冷却电力控制单元，同时，发电机和发动机也能够获得更高的冷却效果。

在本发明的实施方式中，还可进一步达成如下的效果。即，能够高效地冷却发热量大的变流器，并且，能够通过变流器高效地加热燃料容器和燃料压力调节器中的至少一方。

附图说明

图 1 表示本发明的第一实施方式，是应用了本发明的发动机发电机的结构示意图。

图 2 是图 1 的发动机发电机的立体图。

图 3 是在图 2 的发动机发电机中，拆下左盖后的左侧视图，对于前盖、后盖和上盖，是沿图 4 的III-III线的截面图。

图 4 是在图 2 的发动机发电机中，拆下上盖后的俯视图。

图 5 是图 2 的发动机发电机的主视图。

图 6 是图 2 的发动机发电机的燃料切换阀和加热装置中的电路图。

图 7 是表示图 2 的发动机发电机的燃料切换阀的操作位置、燃料供给装置和点火装置之间的关系的表格。

图 8 表示本发明的第二实施方式，是相当于图 3 的图。

图 9 是在本发明的第二实施方式中，相当于图 4 的图。

图 10 表示本发明的其它实施方式，是相当于图 3 的部分的图。

标号说明

Champion - EX2092, Page 188 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

1 … 发动机发电机

3 … 下盖

4 … 上盖

5 … 前盖

6 … 后盖

7 … 左盖

8 … 右盖

9 … 内部空间

12 … 燃料切换阀

16、17、90 … 把持部

18、19、92 … 导入口

20 … 排出口

23、24、91 … 凹部

28、29、93 … 把持用空间

30 … 发动机

40 … 发电机

41 … 电力控制单元

42 … 火花塞

44 … 点火线圈

45 … 冷却风扇

46 … 反冲起动器

47 … 护罩

48 … 风扇罩

49 … 起动器罩

50、51 … 流入口

60 … 容纳部

61 … 盒式高压储气瓶

62 … 燃料压力调节器

63 … 燃料截止阀

Champion - EX2092, Page 189 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

65 … 容纳室

66 … 室壁

68 … 安装传感器

70 … 传热部件

71 … 外部高压气瓶

73 … 燃料压力传感器

74 … 切断开关

75 … 主开关

80 … 加热装置

89 … ECU

C … 箱体

Fa … 燃料供给装置

具体实施方式

以下，参照图 1～图 10 说明本发明的实施方式。

图 1～图 7 表示第一实施方式。参照图 1，应用了本发明的便携式发动机发电机 1 可适当地与设置在该发动机发电机 1 外部的外部燃料系统 Fb 连接。

一并参照图 2、图 3，发动机发电机 1 具有：箱体 C，该箱体 C 大体为长方体的箱状；搬运用的一对把持部 16、17，该把持部 16、17 设置在箱体 C 上，供搬运发动机发电机 1 时把持；发动机 30，该发动机 30 由作为内燃机的燃气发动机构成；燃料供给装置 Fa，该燃料供给装置 Fa 将气体燃料供给到发动机 30；发电机 40，该发电机 40 是由发动机 30 驱动的工作机械；电力控制单元 41，该电力控制单元 41 对发电机 40 所产生的电力进行控制；电子控制单元 89（以下，称为 ECU 89），该 ECU 89 是控制发动机 30 和燃料供给装置 Fa 的控制装置。发动机 30、燃料供给装置 Fa、发电机 40、电力控制单元 41 以及 ECU 89 被箱体 C 包围，从而被容纳在由该箱体 C 形成的内部空间 9 中。由此，箱体 C 构成抑制发动机 30 的运转噪声泄漏到外部的隔音式的箱体 C。

Champion - EX2092, Page 190 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

并且，在说明书和权利要求书中，所谓对把持部 16、17 进行把持，包括用手握住把持部 16、17 的情况和将手按在把持部 16、17 上的情况。

参照图 2～图 5，箱体 C 具有：下盖 3 和上盖 4，该下盖 3 和上盖 4 在作为基准方向的上下方向上相对；前盖 5 和后盖 6，该前盖 5 和后盖 6 是在垂直于上下方向的第一方向上相对的一对侧部盖；左盖 7 和右盖 8，该左盖 7 和右盖 8 是在与上下方向和第一方向垂直的第二方向上或是横向上相对的一对侧部盖。这些盖 3～8 都是合成树脂制成的。

在本实施方式中，第一方向与前后方向一致，第一方向上的一个侧方或另一侧方是前方或后方；此外，第二方向与左右方向一致，第二方向上的一个侧方或另一侧方是左方或右方。

当从下方、上方、前方、后方、左方以及右方对箱体 C 进行观察时，此时的箱体 C 的下表面、上表面、前表面、后表面、左表面以及右表面分别是由上述盖 3～8 构成的箱体 C 中的箱体下部 C3、箱体上部 C4、箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8 的外表面。因此，下盖 3、上盖 4、前盖 5、后盖 6、左盖 7 和右盖 8 分别主要构成箱体下部 C3、箱体上部 C4、箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8。进而，前表面、后表面、左表面以及右表面是箱体 C 的四个侧面；箱体前部 C5、箱体后部 C6、箱体左部 C7 以及箱体右部 C8 是箱体 C 的四个箱体侧部。

前盖 5 和后盖 6 分别结合到一对作为加强部件的加强板 10、11 上，该加强板 10、11 由金属制成，且配置在内侧并与下盖 3 结合。然后，左盖 7 结合到各加强板 10、11 上；可开闭的右盖 8 在下端部 8b 被枢轴支撑在下盖 3 上，在上端部 8a 被卡止装置（未图示）卡止于上盖 4。此外，在各加强板 10、11 上，在比加强板 10、11 更位于内侧的前盖 5 或后盖 6 上形成一部分（例如凹部 23、24）贯通的孔（参照图 3）。此处，内侧和外侧的意思分别是指靠近内部空间 9 和靠近箱体 C 的外部。

参照图 3、图 5，在构成操作板部 5e 的前盖 5 上设置有：燃料切换阀 12；输出用插座 13，用于对电气的外部负载供给电流；外部燃料用连接器 14，用于与配置在发动机发电机 1 外部的外部高压储气瓶 71（参照图 1）

Champion - EX2092, Page 191 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

进行连接；以及指示灯 15a、15b、15c 等。

参照图 2～图 5，在前盖 5 的上部所包括的上端部 5a 上，在设有第一把持部 16 的同时，还设有一个导入口 18，该导入口 18 在发动机 30 运转过程中将外部空气作为冷却风导入到箱体 C 的内部空间 9。另一方面，隔着发动机发电机 1 和电力控制单元 41 而在前后方向上与前盖 5 相对的后盖 6 上形成有：排出口 20，用于将对电力控制单元 41、发电机 40 和发动机 30 进行冷却后的冷却风排出到外部；排气口 21，用于将发动机 30 的废气排出到外部。

当提起发动机发电机 1 进行搬运时搬运者的手所把持的部分，即第一、第二把持部 16、17，分别设置在箱体前部 C5 和箱体后部 C6 的上部 C5a、C6a 所包括的上端部。第一把持部 16 被设置为第一拐角部件，其设置在与上盖 4 大体相同的高度位置，并设置在上盖 4 的前方且前盖 5 的上方；第二把持部 17 被设置为第二拐角部件，其设置在与上盖 4 大体相同的高度位置，并设置在上盖 4 的后方且后盖 6 的上方。设置在箱体 C 的前上角部和后上角部的上述两拐角部件的整体是形成第一把持部 16 和第二把持部 17 的把持部形成部件。

第一、第二把持部 16、17 都是合成树脂制的相同的部件，分别具有上部 16a、17a 和下垂部 16b、17b，该上部 16a、17a 通过密封部件 22（参照图 3）与上盖 4 相抵，并构成箱体上部 C4 的前后方向上的两端部；该下垂部 16b、17b 从上部 16a、17a 以与前盖 5 和后盖 6 相对的方式向下方延伸。下垂部 16b、17b 向下方延伸，使得在发动机发电机 1 被提起时，能够用手从外侧部分 16b1、17b1 经由最下端 16b2、17b2 直到内侧部分 16b3、17b3 进行把持。而且，两最下端 16b2、17b2 分别位于与前盖 5 和后盖 6 的上端部 5a、6a 在该上端部 5a、6a 的横向全长中在上下方向上重叠的位置，在本实施方式中，位于与前盖 5 和后盖 6 的后述的凹部 23、24 在该凹部 23、24 的横向整体中在上下方向重叠的位置。

第一把持部 16 被设置为到达箱体前部 C5 的横向上的两端部 C5c、C5d，并在横向上的两端部通过焊接等与前盖 5 结合为一体。而且，第二把持部 17 被设置为到达箱体后部 C6 的横向上的两端部 C6c、C6d，并在

Champion - EX2092, Page 192 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

横向上的两端部通过焊接等与后盖 6 结合为一体。箱体前部 C5 的横向上的两端部 C5c、C5d 和箱体后部 C6 的横向上的两端部 C6c、C6d 分别是由左盖 7 和右盖 8 构成的部分，或者是在横向上与箱体左部 C7 和箱体右部 C8 相对应的部分。如图 4 所示，第一、第二把持部 16、17 整体在横向上的宽度（以下，将在横向上的宽度称为横宽）分别与前盖 5 的横宽和后盖 6 的横宽大体相等，此外，还与左盖 7 和左盖 7 在横向上的间隔大体相等。

第一把持部 16 与形成在前盖 5 的上端部 5a 上的凹部 23 一起形成导入口 18。凹部 23 位于比第一把持部 16 更靠近内部空间 9 的位置，并且进入内部空间 9 中。凹部 23 具有：倾斜部 23a，该倾斜部 23a 从操作板部 5e 起，越是向上方越是在前后方向上向内部空间 9 倾斜；里部 23b，该里部 23b 从倾斜部 23a 起大体与上下方向平行地向上方延伸。凹部 23 延伸成大体到达第一把持部 16 在横向上的两端部，并且该凹部 23 具有与第一把持部 16 的横宽相比，虽然稍小但大体相等的横宽。

而且，在最下端 16b2 与倾斜部 23a 之间形成导入口 18 的入口 18a（在图 3 中用双点划线表示），该入口 18a 朝前方并向斜下方敞开；在第一把持部 16 的上部 16a 与里部 23b 的上端部之间，形成导入口 18 的出口 18b（在图 3 中用双点划线表示）。此外，入口 18a 形成在第一把持部 16 的下方，导入口 18 被设置为大体到达箱体前部 C5 在横向上的两端部 C5c、C5d。导入口 18 的横宽大体与前盖 5 的横宽、以及左盖 7 和左盖 7 在左右方向上的间隔大体相等。从而，从入口 18a 流入的冷却风沿前后方向流向内部空间 9，然后沿下垂部 16b 的内侧部分 16b3 和里部 23b 偏向上方而流动，再通过上部 16a 在前后方向上向内部空间 9 偏转，然后从出口 18b 流出到内部空间 9 中。这样，第一把持部 16 和凹部 23 将导入口 18 形成为多处弯折的迷宫状的通路。

此外，在前盖 5 中，左右侧缘部 5c、5d 比操作板部 5e 向前方突出，第一把持部 16 比该左右侧缘部 5c、5d 还稍稍突出。而且，箱体前部 C5 的下部 C5b 位于比两侧缘部 5c、5d 更靠近内部空间 9 的位置。

在本实施方式中，加强板 10 的一部分被配置在导入口 18 中，从而构成冷却风的引导部 10a，以便使冷却风顺畅地流动并被导入内部空间 9。

Champion - EX2092, Page 193 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

导入口 18 构成第一把持用空间 28，该第一把持用空间 28 为了在搬运发动机发电机 1 时用手把持第一把持部 16 而被使用。而且，导入口 18 形成在第一把持部 16 的下方，进而，主要由里部 23b 形成的导入口 18 的下游部分 18c 成为进入内部空间 9 的空间。从而，该把持用空间 28 的一部分与箱体上部 C4 相比位于下方，并且是进入内部空间 9 的空间。

另一方面，第二把持部 17 与在后盖 6 的上端部 6a 形成的凹部 24 一起形成第二把持用空间 29，该第二把持用空间 29 为了在搬运发动机发电机 1 时用手把持第二把持部 17 而与第一把持用空间 28 一起被使用。凹部 24 位于比第二把持部 17 更靠近内部空间 9 的位置，并且进入内部空间 9，该凹部 24 具有：倾斜部 24a，该倾斜部 24a 从排出口 20 起，越是向上方越是在前后方向上向内部空间 9 倾斜；里部 24b，该里部 24b 从倾斜部 24a 起大体与上下方向平行地向上方延伸。凹部 24 延伸成大体到达第二把持部 17 在横向上的两端部，并且该凹部 24 具有与第二把持部 17 的横宽相比，虽然稍小但大体相等的横宽。

加强板 11 的一部分延伸到与上盖 4 接触的位置，从而构成封闭部 11b，该封闭部 11b 在前后方向上对第二把持用空间 29 在前后方向上靠近内部空间 9 的部分进行大体地封闭。因此，实质上，外部空气不会通过第二把持用空间 29 而作为冷却风导入到内部空间 9。

而且，第一把持部 16 和第二把持部 17 被配置成在箱体 C 中具有垂直于前后方向的作为对称面的平面；凹部 23 和凹部 24、以及第一把持用空间 28 和第二把持用空间 29 被配置成关于该对称面大体面对称。

参照图 1 和图 3，发动机 30 是单气缸、OHC（顶置凸轮轴）型的四冲程空冷发动机，该发动机 30 具有发动机主体 30a，该发动机主体 30a 包括：气缸 31，其与可以往复移动的活塞 35 配合；曲轴箱 32，其结合在气缸 31 的下端部；气缸盖 33，其与气缸 31 一体成形，从而与活塞 35 之间形成燃烧室；以及气缸盖罩 34，其结合在气缸盖 33 的上端部；发动机主体 30a 被固定在下盖 3 上。气缸 31 和曲轴箱 32 支撑曲轴 36，且该曲轴 36 可旋转并被配置成具有平行于前后方向的旋转中心线，该曲轴 36 在活塞 35 的驱动下旋转。

Champion - EX2092, Page 194 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

一并参照图 2 和图 4，发动机 30 具有进气装置 37，该进气装置 37 具有化油器 37b 和进气管 37c，该进气管 37c 与气缸盖 33 连接以便将进气导入到燃烧室。化油器 37b 是一个混合气形成装置，用于形成空气与气体燃料的混合气，所述空气来自空气滤清器 37a，该空气滤清器设有取入口 37a1，用于将从导入口 18 导入到内部空间 9 的冷却风的一部分取入；所述气体燃料是从燃料供给装置 Fa 或外部燃料系统 Fb 供给的。设置在化油器 37b 中的节气门 37b1 由步进电动机 37d 驱动，该步进电动机 37d 由具有微型计算机的 ECU 89 控制，该节气门 37b1 控制发动机 30 的输出，使得曲轴 36 以预先设定的旋转速度旋转。

发动机 30 具有排气装置 38，该排气装置 38 具有：排气管 38a，该排气管 38a 连接在气缸盖 33 上，以便来自燃烧室的废气流入管中；和消声器 38b，该消声器 38b 与排气管 38a 连接。

此外，混合气经过设置在气缸盖 33 上并由气门装置开闭的进气门 39a 而流入燃烧室，该混合气通过保持在支架 44（参照图 3）上的火花塞 42 来点火并燃烧，然后通过产生的燃烧压驱动活塞 35，从而使曲轴 36 被旋转驱动。燃烧气体作为废气，经过由气门装置开闭的排气门 39b 后，通过排气管 38a 流入消声器 38b，由消声器 38b 降低排气音量之后，经过与形成在后盖 6 上的排气口 21 相面对的排气尾管 38c 而排放到外部大气中。

参照图 1 和图 3，被发动机 30 旋转驱动的发电机 40 具有转子 40a 和定子，所述转子 40a 具有磁体，并且该转子 40a 被固定在作为发动机 30 的输出轴的曲轴 36 的轴端部；所述定子具有线圈，并且该定子被配置在转子 40a 的径向内侧并固定在曲轴箱 32 上。具有火花塞 42 的点火装置具有点火线圈 44（参照图 6），由发电机 40 产生的电力对电容器充电后，供给该点火线圈 44 的初级侧；响应于在曲轴 36 的特定的旋转位置产生的点火信号，使点火线圈 44 中产生的高电压施加给火花塞 42。

此外，被曲轴 36 旋转驱动的冷却风扇 45 结合在转子 40a 上而与转子 40a 一体旋转，从而在发动机 30 的运转中，经由导入口 18 将外部空气作为冷却风吸引到箱体 C 内。此外，发动机 30 通过作为起动装置的反冲起动器 46 的动作而被起动。反冲起动器 46 与冷却风扇 45 相连接，从而，

Champion - EX2092, Page 195 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

通过用与反冲起动器 46 的起动绳 46a 相连接的旋钮拉动起动绳 46a 的操作来驱动曲轴 36 旋转。

参照图 2～图 4，为了提高对运转噪声的隔音效果和冷却风的冷却效果，发动机主体 30a 和排气管 38a 被护罩 47 所覆盖，该护罩 47 在发动机主体 30a 和排气管 38a 之间形成冷却风的导风通路。合成树脂制的护罩 47 被固定在发动机主体 30a 上，同时，在与护罩 47 一体成形的托架 47a 中，被固定在上盖 4 上。此外，冷却风扇 45 被结合在护罩 47 前端部的合成树脂制的风扇罩 48 所覆盖；反冲起动器 46 被结合在风扇罩 48 前端部的起动器罩 49 所覆盖。冷却风扇 45 从形成在起动器罩 49 上的流入口 50 及形成在起动器罩 49 与风扇罩 48 之间的流入口 51 吸引内部空间 9 的空气，并将冷却风输送到护罩 47 内。

配置在冷却风扇 45 和反冲起动器 46 的前方以对发电机 40 产生的电力进行控制的电力控制单元 41 具有：变流器 41a，用于控制该电力的电压和频率（参照图 6）；以及散热翼片 41b，其作为散热器，用于散发包括变流器 41a 在内的电气部件所产生的热量。

而且，在箱体 C 的内部空间 9 中，电力控制部件 41、反冲起动器 46、冷却风扇 45、发电机 40、发动机主体 30a 以及消声器 38b 以该顺序，作为整体向后方，也是在从导入口 18 朝向排出口 20 的冷却风的流动方向上，串连配置在曲轴 36 的旋转中心线上。

参照图 1，燃料系统 F 向发动机 30 供给作为燃料的气体燃料，该燃料系统 F 具有：燃料供给装置 Fa，其配置在箱体 C 或箱体 C 的内部空间 9 中，是发动机发电机 1 所具有的内部燃料系统；和外部燃料系统 Fb，其配置在箱体 C 的外部。

参照图 1～图 4，燃料供给装置 Fa 具有盒式高压储气瓶 61 和燃料压力调节器 62，所述盒式高压储气瓶 61 被配置在设于箱体 C 内的作为燃料容器设置部的容纳部 60 中，是单个或多个作为第一燃料源（或主体侧燃料源）的第一燃料容器。在本实施方式中，燃料压力调节器 62 对从两个盒式高压储气瓶 61 和后述的外部高压储气瓶 71 流出的气体燃料的压力进行减压，同时，调节气体燃料的压力，以便向化油器 18b 供给与发动机 30

Champion - EX2092, Page 196 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

的负载相对应的燃料量。燃料供给装置 Fa 还具有：加热装置 80，用于对盒式高压储气瓶 61 和燃料压力调节器 62 进行加热；燃料切换阀 12，其作为燃料切换装置，设置在操作板部 5e 上；燃料配管组，其包括连接器 14，并且在箱体 C 的内部空间 9 中将盒式高压储气瓶 61、燃料压力调节器 62 以及化油器 18b 等相互连接；以及燃料截止阀 63，其使从燃料系统 F 向发动机 30 的气体燃料的供给停止。

在盒式高压储气瓶 61 中，以液化状态储存沸点较高的气体燃料，例如丁烷。此外，通过将盒式高压储气瓶 61 的燃料供给部插入在设于容纳部 60 的连接器 64（参照图 2）中，盒式高压储气瓶 61 就被可装拆地支撑在容纳部 60 中。

外部燃料系统 Fb 具有外部高压储气瓶 71、连接外部高压储气瓶 71 和连接器 14 的配管 A5、以及减压器 72，所述外部高压储气瓶 71 设置在发动机发电机 1 的外部，是作为第二燃料源（或者外部燃料源）的第二燃料容器。在比盒式高压储气瓶 61 具有更大燃料容量（即，所储存的燃料量多）的外部高压储气瓶 71 中，以液化状态储存有比第一气体燃料沸点更低的第二气体燃料，例如丙烷。该外部高压储气瓶 71 例如是家庭用丙烷高压气瓶。

容纳部 60 由形成容纳室 65 的室壁 66 构成，该容纳室 65 用于容纳两个盒式高压储气瓶 61。室壁 66 包括：第一侧壁 66a，其由热的良导体，例如铝等金属构成；第二侧壁 66b，其由右盖 8 的一部分构成；以及底壁 66c，容纳室 66 的上部在内部空间 9 敞开。两个盒式高压储气瓶 61 和容纳部 60 在沿前后方向与电力控制单元 41、燃料压力调节器 62 以及流入口 50、51 重叠的位置上，被设置得靠近右盖 8。配置在盒式高压储气瓶 61 与电力控制单元 41 及燃料压力调节器 62 之间的第一侧壁 66a 被设置成，其上部根据冷却风来讲位于导入口 18 的出口 18b 的下游，并且，位于在上下方向与出口 18b 重叠的位置。而且，第一侧壁 66a 的上端部位于内部空间 9 的大体最上部。此外，盒式高压储气瓶 61、第一侧壁 66a、燃料压力调节器 62 以及电力控制单元 41 位于在左右方向上与出口 18b 重叠的位置。

在第一、第二侧壁 66a、66b 上，为了防止或抑制由发动机 30 的运转

Champion - EX2092, Page 197 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

引起的振动传递到盒式高压储气瓶 61 上而导致盒式高压储气瓶 61 振动，设置由弹性材料构成的作为防振部件的支撑体 67，使其与盒式高压储气瓶 61 的外周面接触。

在容纳部 60 中设置有安装传感器 68，该安装传感器 68 用于检测盒式高压储气瓶 61 的有无或安装状态。安装传感器 68 被安装在设于容纳室 65 外部的安装部件 69 上，并贯通第一侧壁 66a 而位于容纳室 65 内。安装传感器 68 例如由具有接触片 68a 的微动开关构成，其通过使接触片 68a 接触盒式高压储气瓶 61 来检测盒式高压储气瓶 61 已被正确地安装。

各盒式高压储气瓶 61 接近电力控制单元 41 来进行配置，以便能够与电力控制单元 41 进行热交换。更具体地讲，盒式高压储气瓶 61 通过由热的良导体，例如铝等金属构成的传热部件 70 来与第一侧壁 66a 进行热连接。多个是柱状部件的传热部件 70 在其一端部接触盒式高压储气瓶 61，在另一端部接触第一侧壁 66a。而且，第一侧壁 66a 以邻接的状态与电力控制单元 41 接近配置，以便通过在内部空间 9 中的经由冷却风的热传导能够与电力控制单元 41 进行热交换。因此，各盒式高压储气瓶 61 被配置成经由用传热部件 70 热连接的第一侧壁 66a 能够进行与电力控制单元 41 的热交换。

以液化状态向燃料压力调节器 62 供给来自盒式高压储气瓶 61 的第一气体燃料，并且以气体状态向燃料压力调节器 62 供给来自外部高压储气瓶 71 的第二气体燃料，该燃料调压器 62 被配置在电力控制单元 41 和流入口 50、51 的正上方，并与两个盒式高压储气瓶 61、容纳部 60 的第一侧壁 66a、电力控制单元 41 以及流入口 50、51 在前后方向上重叠。而且，燃料压力调节器 62 以与电力控制单元 41 邻接的状态而接近配置，以便通过在内部空间 9 中的经由冷却风的热传导能够与电力控制单元 41 进行热交换。（在图 4 中，为了方便，燃料压力调节器 62 用双点划线表示。）进而，燃料压力调节器 62 具有使以液化状态流入的第一气体燃料气化的作为蒸发器的功能。

参照图 1，在燃料供给装置 Fa 中，由两个盒式高压储气瓶 61、连接两个盒式高压储气瓶 61 和燃料切换阀 12 的配管 A1、连接燃料切换阀 12 和燃料压力调节器 62 的配管 A2、燃料压力调节器 62、连接燃料压力调节

Champion - EX2092, Page 198 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

器 62 和化油器 18b 的配管 A3、以及设置在配管 A3 上的燃料截止阀 63 构成从盒式高压储气瓶 61 向发动机 30 供给第一气体燃料的第一燃料系统；此外，由连接连接器 14 和燃料切换阀 12 的配管 A4、连接燃料切换阀 12 和燃料压力调节器 62 的配管 A2、燃料压力调节器 62、连接燃料压力调节器 62 和化油器 18b 的配管 A3、以及燃料截止阀 63 构成从外部高压储气瓶 71 向发动机 30 供给第二气体燃料的第二燃料系统。

因此，箱体 C 内的配管 A1～A4 构成燃料配管组。此外，燃料压力调节器 62、配管 A3 以及燃料截止阀 63 在第一、第二燃料系统中是公共的公共燃料系统。

作为燃料切断装置的燃料截止阀 63，例如由在没有驱动电流被供给时为开阀状态的常开电磁阀构成，其根据第一气体燃料的压力由 ECU 89 进行开闭控制。更具体地讲，为了检测来自盒式高压储气瓶 61 的压力，在燃料压力调节器 62 上设置燃料压力传感器 73，该燃料压力传感器 73 用于检测从盒式高压储气瓶 61 到达燃料压力调节器 62 的第一气体燃料的压力。然后，当由燃料压力传感器 73 检测出压力超过上限压力 P1 的压力时，ECU 89 使燃料截止阀 63 闭阀以切断公共燃料系统。该上限压力 P1 是根据如下观点预先设定的，该观点是，在盒式高压储气瓶 61 处于过热状态时等，盒式高压储气瓶 61 内的第一燃料气体的压力成为过大的状态下，避免发动机 30 的运转，从而安全地使用发动机发电机 1。

燃料切换阀 12 将供给发动机 30 的气体燃料在通过第一燃料系统供给的第一气体燃料和通过第二燃料系统供给的第二气体燃料之间进行切换。燃料切换阀 12 可以在以下位置间进行操作：第一位置，燃料切换阀 12 在该位置将第一燃料系统与发动机 30 连接起来，以便将第一气体燃料供给发动机 30（在图 5 中，是“盒式”的位置，用单点划线表示。）；第二位置，燃料切换阀 12 在该位置将第二燃料系统与发动机 30 连接起来，以便将第二气体燃料供给发动机 30（在图 5 中，是“外部”的位置，用双点划线表示。）；停止位置，燃料切换阀 12 在该位置切断第一燃料系统和第二燃料系统与发动机 30，从而停止向发动机 30 供给气体燃料（在图 5 中，是“关断”的位置，用实线表示。），并且，第一位置与第二位置之间的切换总是

Champion - EX2092, Page 199 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

经过停止位置而进行。

一并参照图 6，此外，燃料切换阀 12 进行第一气体燃料与第二气体燃料间的燃料的切换，同时，还兼用作控制发动机 30 的运转和停止的发动机运转开关、和控制点火装置及加热装置 80 的动作和非动作的控制开关。因此，燃料切换阀 12 根据其操作位置对控制点火装置的动作和非动作的断流开关 74 进行开闭，并对控制加热装置 80 的动作和非动作的主开关 75 进行开闭。

加热装置 80 具有：电加热器 81a、81b，其作为加热源，对应每个盒式高压储气瓶 61 而设置在容纳部 60 中；电加热器 82，其作为加热源，设置在燃料压力调节器 62 中；温度传感器 83a、83b、84，其分别检测各盒式高压储气瓶 61 的温度和燃料压力调节器 62 的温度；温度传感器 85a、85b、86，其分别检测电加热器 81a、81b、82 的温度；继电器 87a、87b、88，其根据由温度传感器 83a、83b、84 和温度传感器 85a、85b、86 所检测出的温度，根据 ECU 89 的指令，开闭电加热器 81a、81b、82 的加热电路；指示灯 15a、15b（也参照图 5），其显示电加热器 81a、81b 的动作状态。

电加热器 81a、81b、82 分别加热两个盒式高压储气瓶 61 和燃料压力调节器 62，以促进液化状态的第一气体燃料的气化。由此，能够防止由第一气体燃料气化等引起的盒式高压储气瓶 61 和燃料压力调节器 62 的温度的过度降低，从而防止第一气体燃料的压力的过度降低，使得第一气体燃料稳定地供给发动机 30。

一并参照图 7，当燃料切换阀 12 位于第一位置或第二位置时，处于能够向发动机 30 供给第一气体燃料或第二气体燃料的状态，而且，从断流开关 74 断开时起，点火装置就处于可动作状态，发动机 30 处于可运转状态。（即，燃料切换阀 12 作为发动机运转开关，成为接通状态。）此外，当燃料切换阀 12 处于停止位置时，则停止向发动机 30 供给第一气体燃料或第二气体燃料，而且，从断流开关 74 闭合时起，点火装置就处于非动作状态，发动机 30 停止。（即，燃料切换阀 12 作为发动机运转开关，成为关断状态。）

另一方面，加热装置 80 只在燃料切换阀 12 位于第一位置时，由于主

Champion - EX2092, Page 200 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

开关 75 闭合而成为可动作状态，于是，通过对盒式高压储气瓶 61 和燃料压力调节器 62 进行加热的各电加热器 81a、81b、82，根据盒式高压储气瓶 61 和燃料压力调节器 62 的温度来进行加热控制。此外，当燃料切换阀 12 位于第二位置和停止位置时，由于第一气体燃料不供给发动机 30，所以，主开关 75 断开，从而加热装置 80 成为非动作状态，于是盒式高压储气瓶 61 和燃料压力调节器 62 的加热被停止。

下面，对如上构成的实施方式的作用和效果进行说明。

将燃料切换阀 12 从停止位置操作到第一位置，从而第一气体燃料处于可供给发动机 30 的状态，在该状态下，操作反冲起动机 46，从而发动机 30 起动，然后开始自力运转。然后，由发动机 30 驱动的发电机 40 所产生的电力被电力控制单元 41 控制，并被供给到插座 13 上所连接的电气设备。同时，由发动机 30 驱动的冷却风扇 45 通过流入口 50、51 吸引内部空间 9 的空气。通过该冷却风扇 45 的吸引作用，外气通过导入口 18 而被作为冷却风导入到内部空间 9。

来自导入口 18 的冷却风从内部空间 9 的最上部流入内部空间 9，其一部分通过热传导与第一侧壁 66a 和燃料压力调节器 62 进行了热交换后，流到下方以冷却电力控制 41b，进而，在与第一侧壁 66a 和燃料压力调节器 62 进行了热交换后，通过流入口 50、51 而被冷却风扇 45 吸引。然后，冷却风被冷却风扇 45 输送到护罩 47 内，在护罩 47 内对发动机主体 30a 和排气管 38a 进行了冷却后，冷却消声器 38b，并从排出口 20 被排放到外部。

当通过发动机 30 的运转，盒式高压储气瓶 61 的第一气体燃料的剩余量变得很少等，从而需要切换到外部高压储气瓶 71 的第二气体燃料时，将燃料切换阀 12 临时操作到停止位置，从而发动机 30 被停止。此时，通过断流开关 74 的动作能够使发动机 30 快速地停止。接着，将燃料切换阀 12 操作到第二位置。由此，第二气体燃料成为可供给发动机 30 的状态，然后通过反冲起动机 46 的操作使发动机 30 起动。

此处，在发动机发电机 1 的前盖 5 上形成有凹部 23，该凹部 23 位于比第一把持部 16 更靠近内部空间 9 的位置，第一把持部 16 和凹部 23 共同形成导入口 18，导入口 18 构成第一把持用空间 28，进而，在后盖 6 上

形成有凹部 24，该凹部 24 位于比第二把持部 17 更靠近内部空间 9 的位置，第二把持部 17 和凹部 24 共同构成第二把持用空间 29。

从而，由于冷却风的导入口 18 还兼用作把持用空间 28，所以第一把持用空间 28 被形成为形成内部空间 9 的前盖 5 本身，而且，由于形成第一、第二把持用空间 28、29 的一方的部分就是进入箱体 C 的内部空间 9 的凹部 23、24，所以，与将整个把持用空间形成在发动机发电机的箱体外部的情况相比，能够防止或抑制第一、第二把持部 16、17 从箱体 C 的前盖 5 和后盖 6 突出，从而第一、第二把持部 16、17 并不占用特别大的空间，因此能够使发动机发电机 1 小型化，使保管空间小。而且，由于第一、第二把持部 16、17 的存在不明显，所以第一、第二把持部 16、17 很少使发动机发电机 1 的美观受损，从而能够提高发动机发电机 1 的外观性。再者，由于冷却风的导入口 18 还兼用作第一把持用空间 28，所以不必分别设置导入口 18 和第一把持用空间 28，因此，与将把持用空间与导入口分开设置的情况相比，能够减少对箱体 C 的外观设计的制约。另外，由于第一、第二把持用空间 28、29 位于作为箱体侧部的前盖 5 和后盖 6 上，所以使发动机发电机的搬运变得容易。

此外，在发动机 30 的运转中，由于第一把持部 16 被通过导入口 18 的冷却风吹拂而冷却，所以在把持第一、第二把持部 16、17 以搬运运转中的发动机发电机 1 时，把持部不会被过分加热，从而在发动机发电机 1 的运转过程中也能够会把持部 16、17 进行把持。

第一、第二把持部 16、17 具有向下方延伸的下垂部 16b、17b，以便能够从外侧部分 16b1、17b1 经由最下端 16b2、17b2 直到内侧部分 16b3、17b3 进行握持，从而能够握住下垂部 16b、17b，因此，第一、第二把持部 16、17 的把持变得容易，从而发动机发电机 1 的搬运变得容易。

此外，通过利用具有下垂部 16b 的第一把持部 16 和凹部 23，使导入口 18 形成迷宫状的通路，因此不会因使导入口 18 成为迷宫状而使结构复杂化。而且，由于内部空间 9 通过迷宫状的导入口 18 连通到外部，所以能够能够大幅降低运转噪声的泄漏量。其结果是，不使成本增加就能够减轻通过导入口 18 泄漏到外部的运转噪声。

Champion - EX2092, Page 202 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

第一把持部 16 设置在箱体前部 C5 上；导入口 18 的入口 18a 形成在第一把持部 16 的下方；第一把持部 16 和导入口 18 被设置为到达箱体前部 C5 在横向上的两端部。从而，由于在横向上把持第一把持部 16 的位置的自由度增大，所以能够选择易于把持的位置，以使发动机发电机 1 的搬运变得容易。此外，不损害外观上的美观性就能够加大导入口 18 中的冷却风的吸气面积，而且，通过跨过横向宽范围而流入内部空间 9 的冷却风能够抑制空气在内部空间 9 中的滞留，因此能够提高发动机 30、发电机 40 和电力控制单元 41 的冷却效果。

通过使导入口 18 设置在前盖 5 的上部，当发动机刚停止后处于热浸（hot soak）时，发动机 30、发电机 40 和电力控制单元 41 周围的热气通过对流而上升到内部空间 9 的上部。因此，热气易于从导入口 18 流出，从而促进箱体 C 的内部空间 9 的自然换气，由此能够促进发动机刚停止后的发动机 30、发电机 40 和电力控制单元 41 的冷却。

在前盖 5 中，左右侧缘部 5c、5d 比操作板部 5e 向前方突出，第一把持部 16 比该左右侧缘部 5c、5d 还稍稍突出，而且，箱体前部 C5 的下部 C5b 位于比两侧缘部 5c、5d 更靠近内部空间 9 的位置。因此，发动机发电机 1 即使以前盖 5 接触墙壁等的外部部件的状态被放置时，也由于在左右侧缘部 5c、5d 之间，向下方敞开的空间和下垂部 16b、17b 比两侧缘 5c、5d 突出而在侧缘部 5c、5d 与上述外部部件之间形成间隙，所以能够将充分量的外部空气作为冷却风导入至导入口 18 中。

盒式高压储气瓶 61 和燃料压力调节器 62 被配置成接近电力控制单元 41，以便与电力控制单元 41 进行热交换。因此，在发动机发电机 1 的运转中，由于燃料的气化等而变成低温的盒式高压储气瓶 61 和燃料压力调节器 62 通过经由冷却风的热传递能够与电力控制单元 41 进行热交换。因此，从电力控制单元 41 的散热量增加，换言之，通过盒式高压储气瓶 61 和燃料压力调节器 62 来促进电力控制单元 41 的冷却，以抑制电力控制单元 41 的温度上升。同时，盒式高压储气瓶 61 和燃料压力调节器 62 被电力控制单元 41 加热，以抑制其温度降低。其结果是，在盒式高压储气瓶 61 及燃料压力调节器 62 与电力控制单元 41 之间，通过相互利用彼此的热量，能够

抑制电力控制单元 41 的温度上升，因此能够使作为电力控制单元 41 的散热结构的散热翼片 41b 小型化。此外，由于抑制了盒式高压储气瓶 61 和燃料压力调节器 62 的温度降低，所以能够使加热装置 80 的加热量减少，从而能够使作为加热源的电加热器 81a、81b、82 的消耗电力减少。

盒式高压储气瓶 61 与形成容纳室 65 的第一侧壁 66a 通过传热部件 70 热连接；第一侧壁 66a 接近电力控制单元 41 而配置，以便能够与电力控制单元 41 进行热交换，从而盒式高压储气瓶 61 中的从电力控制单元 41 的受热，以及电力控制单元 41 的散热都通过传递盒式高压储气瓶 61 的热量的第一侧壁 66a 进行。因此，由于在盒式高压储气瓶 61 与电力控制单元 41 之间进行热交换，所以能够减小对盒式高压储气瓶 61 和电力控制单元 41 的配置的制约。此外，通过加大第一侧壁 66a，或者使第一侧壁 66a 与电力控制单元 41 更加接近等的第一侧壁 66a 的形状或配置，能够使盒式高压储气瓶 61 与电力控制单元 41 之间的传热量增加，从而能够提高盒式高压储气瓶 61 与电力控制单元 41 之间的相互的热量的利用率。其结果是，能够在通过第一侧壁 66a 而相互利用盒式高压储气瓶 61 和电力控制单元 41 之间的热量的基础上，加大盒式高压储气瓶 61 和电力控制单元 41 的配置的自由度，此外能够提高盒式高压储气瓶 61 和电力控制单元 41 的相互的热量的利用率，从而能够更加高效地进行盒式高压储气瓶 61 对电力控制单元 41 的冷却，以及电力控制单元 41 对盒式高压储气瓶 61 的加热。

经过导入口 18 被导入内部空间 9 的冷却风的至少一部分通过第一侧壁 66a 依次冷却了盒式高压储气瓶 61、燃料压力调节器 62 以及电力控制单元 41 后，对发电机 40 和发动机 30 进行冷却，从而，被导入内部空间 9 的冷却风被盒式高压储气瓶 61 和燃料压力调节器 62 冷却为更低的温度，该成为低温的冷却风首先冷却电力控制单元 41，然后冷却发电机 40 和发动机 30。因此，能够更加有效地冷却电力控制单元 41，并且发电机 40 和发动机 30 也能够得到更高的冷却效果。

由于变流器 41a 的切换损失大，发热量大，所以，由于其动作而成为高温的变流器 41a 被盒式高压储气瓶 61 和燃料压力调节器 62 有效地冷却，从而抑制了变流器 41a 的升温；盒式高压储气瓶 61 和燃料压力调节器 62

Champion - EX2092, Page 204 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

被高温的变流器 41a 有效地加热，从而抑制了其温度降低。其结果是，发热量大的变流器 41a 被有效地冷却，且盒式高压储气瓶 61 和燃料压力调节器 62 被变流器 41a 有效地加热。

燃料压力调节器 62 在上下方向和左右方向上处于与导入口 18 重叠的位置，并且配置在电力控制单元 41 的正上方，从而，从导入口 18 流入内部空间 9 的冷却风由于燃料压力调节器 62 而朝向电力控制单元 41 偏转方向，因此，通过从导入口 18 刚流入内部空间 9 的冷却风，能够进一步促进电力控制单元 41 的冷却。

流入口 50、51 在前后方向上位于与第一侧壁 66a 和燃料压力调节器 62 重叠的位置，从而，通过与第一侧壁 66a 和燃料压力调节器 62 的热交换而被冷却了的冷却风从流入口 50、51 流入，因此，促进了发动机主体 30a 和消声器 38b 的冷却。

下面，参照图 8、图 9 对本发明的第二实施方式进行说明。该第二实施方式在第二把持部 17 形成冷却风的导入口这一点上与第一实施方式不同，其它基本具有相同的结构。因此，对相同部分的说明加以省略或简化，以不同点为中心进行说明。并且，对与第一实施方式的部件相同的部件或对应的部件，根据需要使用了相同的标号。

第二把持部 17 与凹部 24 共同形成作为第二导入口的导入口 19。在下垂部 17b 的最下端 17b2 与倾斜部 24a 之间，形成朝向后方并与后方平行敞开的导入口 19 的入口 19a；在第二把持部 17 的上部 17a 与里部 24b 的上端部之间形成导入口 19 的出口 19b。此外，入口 19a 形成在第二把持部 17 的下方，导入口 19 被设置为大体到达箱体后部 C6 在横向上的两端部 C6c、C6d。导入口 19 的横宽与作为第一导入口的导入口 18 的横宽相等，进而与后盖 6 的横宽大体相等。

因此，从入口 19a 流入的冷却风沿前后方向朝内部空间 9 流动后，沿下垂部 17b 的内侧部分 17b3 和里部 24b 偏向上方流动，进而，通过上部 17a 而沿前后方向朝内部空间 9 偏转方向后，从出口 19b 流出到内部空间 9 中。这样，第二把持部 17 与凹部 24 形成使第二导入口 19 在多个部位弯曲的迷宫状的通路。

此外，加强板 11 的一部分配置在导入口 19 中，从而构成冷却风的引导部 11a，以使冷却风顺畅地流动并被导入内部空间 9。

而且，导入口 19 构成第二把持用空间 29，该第二把持用空间 29 在搬运发动机发电机 1 时，为了用手把持第二把持部 17 而被使用。导入口 19 形成在第二把持部 17 的下方，并且，主要由里部 24b 形成的导入口 19 的下游部分 19c 进一步成为进入内部空间 9 的空间，因此，第二把持用空间 29 的一部分是比箱体上部 C4 位于下方，并且进入内部空间 9 的空间。

根据该第二实施方式，除了能够达到与第一实施方式相同的效果外，还能够达到如下的作用和效果。

即，第一、第二把持部 16、17 分别设置于在箱体 C 中隔着发电机 40 和发动机 30 而相对的前盖 5 和后盖 6 上，第一、第二把持部 16、17 与前盖 5 的凹部 23 及后盖 6 的凹部 24 共同分别形成一对导入口 18、19，从而，冷却风从两侧夹持发动机 30 和发电机 40 而流入内部空间 9 内，因此，与只有一个导入口的情况相比，由于刚流入内部空间 9 后的较低温度的冷却风流过发动机 30 和发电机 40 的周围，所以能够促进发动机 30 和发电机 40 的冷却。此外，在发动机刚停止后处于热浸时等，由于发动机 30、发电机 40 以及电力控制单元 41 周围的热气通过对流而上升到内部空间 9 的上部，所以，易于从分别位于箱体前部 C5 和箱体后部 C6 的上部 C5a、C6a 的两导入口 18、19 流出到外部，而且，与导入口只有一个的情况相比，更易于流出，从而能够进一步促进箱体 C 的内部空间 9 的自然换气。其结果是，通过来自一对导入口 18、19 的冷却风，能够提高发动机 30、发电机 40 以及电力控制单元 41 的冷却效果，而且能够促进发动机刚停止后的发动机 30、发电机 40 和电力控制单元 41 的冷却。

两导入口 18、19 在电力控制单元 41、发电机 40、发动机主体 30a 和消声器 38b 串行排列的方向上相对设置，从而，来自靠近电力控制单元 41 的导入口 18 的冷却风，与第一实施方式相同，顺次冷却电力控制单元 41、发电机 40、发动机主体 30a 和消声器 38b；另一方面，来自靠近发动机 30 的导入口 19 的冷却风的大部分流过护罩 47 的周围而从流入口 50、51 被冷却风扇 45 吸引后，被输送到护罩 47 内，以顺次冷却发电机 40、发动机

Champion - EX2092, Page 206 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

主体 30a 和消声器 38b。其结果是，由于发电机 40 和发动机 30 通过几乎没有被电力控制单元 41 加热的冷却风来进行冷却，所以能够提高发电机 40、发动机主体 30a 和消声器 38b 的冷却效果。

以下，针对变更上述实施方式的一部分结构后的实施方式，对其变更后的结构进行说明。

第一把持用空间 28 并不是如上述实施方式那样，基本上只由导入口 18 构成，如图 10 所示，也可以由内部空间 9 的一部分和第一导入口 92 来构成第一把持用空间 93。更具体地讲，第一把持部 90 与前盖 5 的凹部 91 共同形成第一导入口 92，同时，与构成前盖 5 或箱体 C 的其它盖 4 等同样地，也形成内部空间 9。即，作为用手把持的部分的下垂部 90b 的内侧部分 90b1 形成内部空间 9。此时，由第二把持部和后盖形成的第二把持用空间既可以与第一实施方式同样地被封闭，也可以与第一把持用空间 93 同样地，由内部空间 9 的一部分、和由第二把持部及后盖的凹部共同形成的第二导入口来构成。此外，在图 10 中，如双点划线例示的那样，也可以不在前盖 5 和后盖上分别形成用于形成第一导入口和第二导入口的凹部。

如果这样，由于冷却风的导入口 92 兼用作第一把持用空间 93，所以，第一把持用空间 93 被形成为形成内部空间 9 的前盖 5 本身，进而，将箱体 C 的内部空间 9 作为第一把持用空间 93 的一部分来利用，因此，与将把持用空间的整体形成在箱体 C 的外部的情况相比，能够防止或抑制第一把持部 90 从箱体 C 的前盖 5 突出。其结果是，以发动机发电机 1 的小型化和保管空间的缩小这点为首，在减少对箱体 C 的外观设计的制约等方面上，也与第一实施方式起到同样的效果。

在上述实施方式中，箱体 C 主要由 6 个盖构成，但也可以由 6 个以外的数量的盖构成。

第一、第二把持部 16、17 和导入口 18、19、92 也可以在箱体前部 C5 或箱体后部 C6 中设置在上端部以外的上部、下部、或设置在上下方向的上部与下部的中间部，此外也可以设置在箱体上部 C4 中。导入口 18、19、92 也可以以形成第一、第二把持用空间 28、29、93 为前提，沿横向被分割为多个。

Champion - EX2092, Page 207 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121

在上述实施方式中，第一、第二把持部由把持部形成部件的整体构成，但各把持部也可以将构成箱体 C 的箱体结构部件，例如前盖 5、后盖 6 或上盖 4 作为把持部形成部件，来一体地成型为把持部形成部件，并由其一部分构成，或者由与上述箱体结构部件不同的其它部件来构成，并一体地结合在该箱体结构部件上。第一、第二把持部也可以是能用手按住的形状。

盒式高压储气瓶 61、室壁 66 或燃料压力调节器 62 中的至少一个也可以通过由热的良导体构成的传热部件，或者直接地热连接到电力控制单元 41 的散热翼片 41b 上。从而，由于盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方与电力控制单元 41 之间的传热是通过传热部件利用热传导而进行，所以能够进一步提高相互的热量利用率。其结果是，由于盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方与电力控制单元 41 之间的相互的热量利用率进一步提高，所以，由盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方对电力控制单元 41 的冷却效果、以及由电力控制单元 41 对盒式高压储气瓶 61 和燃料压力调节器 62 中的至少一方的加热效果进一步提高。

盒式高压储气瓶 61 和燃料压力调节器 62 中的任何一个也可以对应电力控制单元 41 以能够与电力控制单元 41 进行热交换的方式进行配置。

用于配置盒式高压储气瓶 61 的燃料配置部也可以不必由容纳部 60 构成，因此，在与电力控制单元 41 之间也可以不设置室壁 66。

第一气体燃料也可以以气化状态供给燃料压力调节器 62。第 2 气体燃料也可以是丙烷以外的气体燃料，例如也可以是城市煤气，此外，第二燃料源也可以是供给第二气体燃料的管道。

加热装置 80 的加热源也可以是电加热器以外的热源，例如，也可以利用发动机废气的热等，发动机的余热。此外，由于在盒式高压储气瓶 61 及燃料压力调节器 62 与电力控制单元 41 之间相互利用彼此的热，所以通过电力控制单元 41 的热量抑制盒式高压储气瓶 61 和燃料压力调节器 62 的降温，因此能够利用较低温度的加热源等，从而增加了加热源的选择项，甚至不需要对盒式高压储气瓶 61 或燃料压力调节器 62 加热的加热装置。

Champion - EX2092, Page 208 of 387
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.
IPR2025-01121