UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 11,492,985 B2
APPLICATION NO.	: 16/783455
DATED	: November 8, 2022
INVENTOR(S)	: Sarder et al.

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

On the Title Page:

The first or sole Notice should read --

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 130 days.

Signed and Sealed this
Fourteenth Day of May, 2024

Katherine Kelly Vidal

Katherine Kelly Vidal
Director of the United States Patent and Trademark Office

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
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 05/14/2024

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

EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
05/14/2024	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@zpatents.com
jmf@zpatents.com
lje@zpatents.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
16/783,455	14-May-2024	11492985

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

ELECTRONIC CERTIFICATE OF CORRECTION NOTIFICATION

Your electronic certificate of correction is now available, and can be accessed via Patent Center at https://patentcenter.uspto.gov.

The electronic certificate of correction is the official certificate of correction under 35 U.S.C. 254 or 255. For more information, please visit https://www.uspto.gov/electronicgrants.

Champion - EX2108, Page 3 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 05/04/2023

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

EXAMINER	
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info@zpatents.com
jmf@zpatents.com
lje@zpatents.com

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Inventors: Sarder et al.	:	DECISION ON REQUEST FOR
Patent No. 11,492,985	:	RECONSIDERATION OF PATENT
Issue Date: November 8, 2022	:	TERM ADJUSTMENT AND
Application No. 16/783,455	:	NOTICE OF INTENT TO ISSUE
Filing Date: February 6, 2020	:	CERTIFICATE OF CORRECTION
Attorney Docket No. CET1090.074	:	

This is a decision on the request under 37 C.F.R. § 1.705 filed January 9, 2023, which requests the patent term adjustment on the patent be corrected to indicate the term of the patent is extended or adjusted by one hundred thirty (130) days.

The request to correct the patent term adjustment indicated on the patent to indicate the term of the patent is extended or adjusted by one hundred thirty (130) days is **GRANTED**.

The application is being forwarded to the Certificates of Correction Branch for issuance of a certificate of correction indicating that the term of the patent is extended or adjusted by one hundred thirty (130) days.

Telephone inquiries specific to this decision should be directed to Attorney Advisor Steven Brantley at (571) 272-3203.

/Charles Steven Brantley/

Charles Steven Brantley
Attorney Advisor
Office of Petitions

Enclosure: Draft Certificate of Correction

DRAFT COPY

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	:	11,492,985 B2
APPLICATION NO.	:	16/783,455
DATED	:	November 8, 2022
INVENTOR(S)	:	Sarder 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:

On the Title page,

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days.

Delete the phrase “by 6 days” and insert -- by 130 days--

Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Patent Number	:	11,492,985
Issued	:	November 8, 2022
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin Anthony Lathers

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 Patent Center to the Office of Petitions at the US PTO.

Date: January 9, 2023 Signature: /Jacob M. Fritz/

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

PETITION FOR PATENT TERM ADJUSTMENT RECONSIDERATION UNDER 37 C.F.R. §1.705(b)

Dear Sir or Madame:

Applicant hereby requests reconsideration of the calculation of patent term adjustment of U.S. Patent No. 11,492,985 under 37 C.F.R. §1.705(b) for the reasons set forth below.

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

REMARKS

The Issue Notification mailed October 19, 2022 for U.S. Patent No. 11,492,985 (hereinafter the "Issued Patent") stated, "The Patent Term Adjustment is 6 day(s)." Similarly, the Issued Patent includes the following notice: "Subject to any disclaimer, term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days." A review of Patent Center Patent Term Adjustment shows that the USPTO calculation includes an A Delay of 60 days, a B Delay of 0 days, a C Delay of 0 days, and an Applicant Delay of 54 days. Applicant is in agreement with the Applicant delay of 54 days. However, Applicant is in disagreement with the USPTO calculation of the A Delay and the C Delay and respectfully believes that a total Patent Term Adjustment of 130 days is proper.

Based on a review of the Patent Term Adjustment calculation, the basis for A Delay of 60 days appears to be 37 C.F.R. §1.702(a)(2) for a delay in mailing a Decision on Appeal not later than four months after the date of the filing of a Reply Brief per 37 C.F.R. §703(b)(4). Applicant filed a Reply Brief on October 13, 2021, so a Decision on Appeal was due by February 13, 2022. 37 C.F.R. §§1.702(a)(2) & 703(b)(4). Since the Decision on Appeal was mailed April 14, 2022, the Decision on Appeal was mailed 60 days past the four months noted in 37 C.F.R. §1.702(a)(2). However, Applicant respectfully submits that Applicant is entitled to Patent Term Adjustment under 37 C.F.R. §1.702(e) due to delays caused by successful appellate review.

In the Decision on Appeal mailed April 14, 2022, the Board reversed each rejection set forth by the Examiner except for the provisional double patent rejection of claims 1-19, which the Board held was "not yet ripe for review." *Decision on Appeal*, Appeal No. 2022-000142, 04/14/2022, pp. 7-8. While Applicant filed an Amendment/Response to the Decision on Appeal on May 10, 2022, Applicant filed the Amendment/Response merely to summarize an interview with the Examiner regarding withdrawal of the provisional nonstatutory double patenting rejection of claims 1-19 and correct an antecedent basis error in claim 11. Thereafter, in the Notice of Allowability mailed July 7, 2022, the Examiner indicated on page 1 that the Notice "is responsive to patent board decision on 04/14/2022" and on page 2 that "the closest prior art fails to disclose or make obvious the limitations of the independent claims as per the patent board decision on 04/14/2022." *Notice of Allowability*, 07/07/2022, pp. 1-2.

Since the Board held in favor of Applicant in Decision on Appeal on all appealable issues and the remanding of the Board was the last action by the Board prior to the mailing of a Notice

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IPR2025-01463

of Allowance, Applicant respectfully submits that Applicant is entitled to Patent Term Adjustment under 37 C.F.R. §§1.702(e) and 1.703(e) due to delays caused by successful appellate review. Applicant suspects that the Patent Term Adjustment calculation in the Issue Notification and the Issued Patent is the result of a mischaracterization of the Decision on Appeal in the file history. That is, in the Documents tab of the Documents and Transaction section of Patent Center for the Issued Patent, the "Doc Description" for the Decision on Appeal is incorrectly names it "Patent Board Decision – Examiner Affirmed" instead of "Patent Board Decision – Examiner Reversed" (emphasis added). A screenshot of the Documents tab is attached hereto as Appendix A with the Decision on Appeal highlighted on page 2.

Since Applicant filed a Reply Brief on October 13, 2021 and the Decision on Appeal was mailed April 14, 2022, Applicant respectfully submits that Applicant is due a C Delay of 184 days of Patent Term Adjustment due to delays caused by successful appellate review. Further, Applicant tent respectfully submits that the Issued Patent is not subject to a terminal disclaimer and that Applicant did not bring about any circumstances constituting a failure to engage in reasonable efforts to conclude processing or examination of the application other than with respect to the Applicant delay of 54 days already calculated by the Office. Since 184 days less 54 days is 130 days, Applicant respectfully requests 130 days of Patent Term Adjustment.

In summary, the USPTO calculation of Patent Term Adjustment should include the entire delay caused by the successful appellate review by the Board under 37 C.F.R. §§1.702(e) and 1.703(e). Therefore, Applicant is entitled to its full Patent Term Adjustment for the Issued Patent of 130 days.

The fee of $210 as set forth in 37 C.F.R. §1.18(e) is filed concurrently herewith.

Applicant hereby requests that any questions regarding this matter be directed to the undersigned.

Dated: January 9, 2023
Attorney Docket No.: CET1090.074

Respectfully submitted,

/Jacob M. Fritz/

P.O. ADDRESS:
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136 South Wisconsin Street
Port Washington, WI 53074
262-268-8100

Jacob M. Fritz
Registration No. 71,459
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jmf@zpspatents.com

Champion - EX2108, Page 10 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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Application Data
Documents & Transactions
Continuity
Patent Term Adjustment
Foreign Priority
Fee Payment History
Address & Attorney/Agent Information
Supplemental Content
Assignments
Display References

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16/783,455 | CET1090.074: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Public view

Application #	Attorney Docket #	Patent #	Status
16/783,455	CET1090.074	11,492,965 Issued - 11/08/2022	Patented Case - 10/18/2022

Documents & transaction history

Documents | Transactions

Mail room date	Doc code	Doc description
10/18/2022	ISSUE.NTF	Issue Notification
10/05/2022	LET.	Miscellaneous Incoming Letter
10/05/2022	N417	Electronic Filing System(EFS) Acknowledgment Receipt
10/05/2022	N417.PYMT	Electronic Fee Payment
10/05/2022	IFEE	Issue Fee Payment (PTO-85B)
07/27/2022	NOA	Notice of Allowance and Fees Due (PTOL-85)
07/27/2022	IFW	Issue Information including classification, examiner, name, claim, renumbering, etc.
07/27/2022	PWCLM	Index of Claims
07/15/2022	OA.POSTCARD	A courtesy postcard sent by USPTO to users who opt-in for e-Office Action
07/07/2022	NOA	Notice of Allowance and Fees Due (PTOL-85)
07/07/2022	SRFW	Search Information including classification, databases and other search related notes
07/07/2022	IFW	Issue Information including classification, examiner, name, claim, renumbering, etc.

07/07/2022	IMCLM	Index of Claims
07/07/2022	SRNT	Examiners search strategy and results
07/07/2022	BIB	Bibliographic Data Sheet
07/07/2022	1449	List of References cited by applicant and considered by examiner
05/16/2022	EC.A	Amendment/Argument after Patent Board Decision
05/16/2022	CLM	Claims
05/16/2022	AMA	Applicant Arguments/Remarks Made in an Amendment
05/10/2022	N417	Electronic Filing System(EFS) Acknowledgment Receipt
05/10/2022	N417.PYMT	Electronic Fee Payment
05/10/2022	FOR	Foreign Reference
05/10/2022	IDS	Information Disclosure Statement (IDS) Form (SB08)
05/10/2022	FOR	Foreign Reference
05/10/2022	FOR	Foreign Reference
05/10/2022	FOR	Foreign Reference
05/10/2022	FOR	Foreign Reference
05/10/2022	FOR	Foreign Reference
05/10/2022	NPL	Non Patent Literature
05/10/2022	WFEE	Fee Worksheet (SB06)
04/22/2022	OA.POSTCARD	A courtesy postcard sent by USPTO to users who opt-in for e-Office Action
04/18/2022	892	List of references cited by examiner
03/24/2022	APTA	Patent Board Decision - Examiner Affirmed
10/18/2021	AE.DOCK	Appeal Docketing Notice
10/13/2021	APRB	Reply Brief Filed
10/13/2021	N417.PYMT	Electronic Fee Payment
10/13/2021	N417	Electronic Filing System(EFS) Acknowledgment Receipt
08/31/2021	OA.POSTCARD	A courtesy postcard sent by USPTO to users who opt-in for e-Office Action
08/13/2021	APEA	Examiner's Answer to Appeal Brief
08/13/2021	892	List of references cited by examiner

08/03/2022	FWCLM	Index of Claims
07/06/2021	APPB	Appeal Brief Filed
07/06/2021	MAIL	Electronic Filing System(EFS) Acknowledgment Receipt
05/05/2021	NOAP	Notice of Appeal Filed
05/03/2021	MAIL.PYMT	Electronic Fee Payment
05/03/2021	MAIL	Electronic Filing System(EFS) Acknowledgment Receipt
04/16/2021	CTAV	Advisory Action (PTOL-303)
04/16/2021	AMEI	Amendment After Final or under 37CFR 1.312, initiated by the examiner.
03/31/2021	A.NE	Response After Final Action
03/31/2021	CLM	Claims
03/31/2021	MAIL	Electronic Filing System(EFS) Acknowledgment Receipt
03/31/2021	REM	Applicant Arguments/Remarks Made in an Amendment
03/31/2021	EXIA	Authorization for Extension of Time 3 months
03/31/2021	WFEE	Fee Worksheet (SB06)
03/09/2021	CAR.POSTCARD	A courtesy postcard sent by USPTO to users who opt-in for e-Office Action
02/03/2021	CTFR	Final Rejection
02/01/2021	IDS	List of references cited by examiner
02/01/2021	FWCLM	Index of Claims
02/01/2021	SRFW	Search information including classification, database and other search related notes
02/01/2021	1449	List of References cited by applicant and considered by examiner
02/01/2021	NPL	Non Patent Literature
12/15/2020	IDS	Information Disclosure Statement (IDS) Form (SB08)
12/15/2020	NPL	Non Patent Literature
12/15/2020	NPL	Non Patent Literature
12/15/2020	MAIL	Electronic Filing System(EFS) Acknowledgment Receipt
12/15/2020	NPL	Non Patent Literature
12/15/2020	NPL	Non Patent Literature
12/15/2020	NPL	Non Patent Literature

12/15/2020	FOR	Foreign Reference
12/15/2020	FOR	Foreign Reference
12/15/2020	NPL	Non Patent Literature
12/15/2020	NPL	Non Patent Literature
12/15/2020	FOR	Foreign Reference
12/15/2020	FOR	Foreign Reference
10/02/2020	a...	Amendment/Request for Reconsideration-After Non-Final Rejection
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07/07/2020	NPL	Non Patent Literature
07/07/2020	NPL	Non Patent Literature
07/07/2020	NPL	Non Patent Literature
07/07/2020	SRNT	Examiner's search strategy and results
07/07/2020	NPL	Non Patent Literature
06/08/2020	NPUB	Notice of Publication
03/27/2020	WFEE	Fee Worksheet (SB06)
03/27/2020	APPEAL.FEE	Filing Receipt
03/06/2020	PA..	Power of Attorney
03/06/2020	PA..	Power of Attorney
03/06/2020	WFEE	Fee Worksheet (SB06)
03/06/2020	M417	Electronic Filing System(EFS) Acknowledgment Receipt

02/06/2020	ADS	Application Data Sheet
02/06/2020	SPEC	Specification
02/06/2020	CLM	Claims
02/06/2020	ABST	Abstract
02/06/2020	OATH	Oath or Declaration filed
02/06/2020	DRW	Drawings-only black and white line drawings

100 per page ▾ Page 1 of 1 ▾

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**01/09/2023 07:06:16 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	11492985
CONFIRMATION #	2063	FILED BY	Jacob Fritz
PATENT CENTER #	61410575	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023.01.09 Petition for Patent Term Adjustment.pdf	8	Patent Term Adjustment Petition	661 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023.01.09 Petition for Patent Term Adjustment.pdf	4BA672A6CFCED830CD8D829EFA0D8512178609647603C791391BC475687B007F618CFA0A5C3F41335029DBDB43FAD69D18951E7F07EC5FB2A9ED6E66AC6988FD

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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 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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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	01/09/2023 07:06:16 PM ET	CET1090.074

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	11492985
CONFIRMATION #	2063	FILED BY	Jacob Fritz
PATENT CENTER #	61410575	AUTHORIZED BY	-
CUSTOMER #	26629	FILING DATE	02/06/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Mark J. Sarder

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 4529	E202319J09062207	Jacob Fritz

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2455	FILING AN APPLICATION FOR PATENT TERM ADJUSTMENT	210.00	1	210.00
			TOTAL AMOUNT:	$210.00

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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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	11/08/2022	11492985	CET1090.074	2063

26629 7590 10/19/2022

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 6 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 Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

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

Mark J. Sarder, Waukesha, WI;
Aleko D. Sotiriades, Cedarburg, WI;
James J. Dehn, Brookfield, WI;
Leigh Jenison, Hartland, WI;

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

Champion Power Equipment, Inc., Santa Fe Springs, CA;

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.

Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin Anthony Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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

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

37 CFR 1.8(a) **37 CFR 1.10**

□ 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 Kevin Anthony Lathers** at the Patent and Trademark Office.

■ transmitted by EFS-WEB addressed to **Examiner Kevin Anthony Lathers** at the Patent and Trademark Office.

Date: October 5, 2022 /Robyn L. Templin/
Signature

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

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Dear Sir or Madame:

Responsive to the Notice of Allowability mailed July 7, 2022, Applicant submits the following remarks responsive to the Examiner's Statement of Reasons for Allowance.

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 1-19.

The patentability of claims 1-19 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/

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

Dated: October 5, 2022
Attorney Docket No.: CET1090.074

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

Champion - EX2108, Page 22 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**10/05/2022 12:20:56 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	61035661	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Timothy Ziolkowski

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2022.10.05 Issue Fee.pdf	1	Issue Fee Payment (PTO-85B)	198 KB
2022.10.05 Comments on Reasons.pdf	2	Miscellaneous Incoming Letter	127 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2022.10.05 Issue Fee.pdf	97DF61AB92FF85B4D9F31C82C3751E07A928340F056CB3DA9 24C8CA443CE4E535FA557DB44B6D2A56FDCBB92780B8231B 179FD27CEEDA209DE8C747DD20D4B3A

2022.10.05 Comments on Reasons.pdf	A8B041432871582ECC41F0F87D89D26307D1B4DA57A98BD755A7AADD763BBA17A9AF58191E4CBC7373CEB88CAF06B70CF09763E647FD53B1377EC6D744B733E6

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 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

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	10/05/2022 12:20:56 PM ET	CET1090.074

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

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CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	61035661	AUTHORIZED BY	Timothy Ziolkowski
CUSTOMER #	26629	FILING DATE	02/06/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Mark J. Sarder

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 8631	E202205C22344671	Robyn Templin

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2501	UTILITY ISSUE FEE	600.00	1	600.00
			TOTAL AMOUNT:	$600.00

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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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 07/07/2022

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.

Robyn L. Templin	(Typed or printed name)
/Robyn L. Templin/	(Signature)
October 5, 2022	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

TITLE OF INVENTION: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	10/07/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
LATHERS, KEVIN ANTHONY	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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 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): Sante 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 /Timothy J. Ziolkowski/ Date October 5, 2022

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

Champion - EX2108, Page 27 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip, Inc.
IPR2025-01463

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 07/27/2022

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

EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
07/27/2022	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
jmf@zpspatents.com
lje@zpspatents.com

Corrected ***Notice of Allowability***	**Application No.** 16/783,455	**Applicant(s)** Sarder et al.	
	Examiner KEVIN A LATHERS	**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 claims filed 05/10/2022.
   ☐ 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 _____ . 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 a reply 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 _____.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

CPC								
Symbol							**Type**	**Version**
F02D	/	19	/	0613			F	2013-01-01
F02D	/	19	/	0605			I	2013-01-01
F02D	/	19	/	0647			I	2013-01-01
F02D	/	19	/	0673			I	2013-01-01
Y02T	/	10	/	30			A	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	25 July 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220725

Champion - EX2108, Page 30 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

INTERNATIONAL CLASSIFICATION					
CLAIMED					
F02D19/06	/	19	/	06	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747 (Primary Examiner) 25 July 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	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		10		19										
	2		11												
	3		12												
	4		13												
	5		14												
	6		15												
	7		16												
	8		17												
	9		18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	25 July 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20220725

Champion - EX2108, Page 32 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	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	07/21/2020	08/05/2021	06/29/2022	07/25/2022					
	1	✓	A	=	=					
	2	✓	A	=	=					
	3	✓	A	=	=					
	4	✓	A	=	=					
	5	✓	A	=	=					
	6	✓	A	=	=					
	7	✓	A	=	=					
	8	✓	A	=	=					
	9	✓	A	=	=					
	10	✓	A	=	=					
	11	✓	A	=	=					
	12	✓	A	=	=					
	13	✓	A	=	=					
	14	✓	A	=	=					
	15	✓	A	=	=					
	16	✓	A	=	=					
	17	✓	A	=	=					
	18	✓	A	=	=					
	19	✓	A	=	=					

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

Courtesy Reminder for
Application Serial No: 16/783,455

Attorney Docket No: CET1090.074
Customer Number: 26629
Date of Electronic Notification: 07/07/2022

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

jmf@zpspatents.com
lje@zpspatents.com
info@zpspatents.com

To view your correspondence online or update your email addresses, please visit us anytime at **https://ppair-my.uspto.gov/pair/PrivatePair.**
If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

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 07/07/2022

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

EXAMINER
LATHERS, KEVIN ANTHONY

ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 07/07/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

TITLE OF INVENTION: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	10/07/2022

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. 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 - EX2108, Page 35 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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 07/07/2022

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.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

TITLE OF INVENTION: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	10/07/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
LATHERS, KEVIN ANTHONY	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/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 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 _____
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 - EX2108, Page 36 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip. Inc.
IPR2025-01463

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 07/07/2022

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

EXAMINER	
LATHERS, KEVIN ANTHONY	
ART UNIT	PAPER NUMBER
3747	

DATE MAILED: 07/07/2022

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.

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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.
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

Notice of Allowability	Application No. 16/783,455	Applicant(s) Sarder et al.	
	Examiner KEVIN A LATHERS	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 patent board decision on 04/14/2022.
   ☐ 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 1-19 . 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 a reply 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 _____.

/KEVIN A LATHERS/
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.

Allowable Subject Matter

2. Claims 1-19 are allowed.

3. The following is an examiner's statement of reasons for allowance: The closest prior art fails to disclose or make obvious the limitations of the independent claims as per the patent board decision on 04/14/2022.

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

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN A LATHERS whose telephone number is (571)272-1050. The examiner can normally be reached M-F 10a-6p.

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 5712721196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To

file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

CPC - Searched*		
Symbol	Date	Examiner
F02D19/0613, 19/0605, 19/0647	07/21/2020	/k.L./
Y02Y10/36	07/21/2020	/k.L./

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
Google and EAST searches.	07/21/2020	/K.L./
Inventor and assignee search.	07/21/2020	/K.L./
Youtube search.	01/27/2021	/K.L./
Interference search.	06/29/2022	/K.L./

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
F02D	19/0673, 19/0647, 19/0605, 19/0613	06/29/2022	/K.L./

/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	

Champion - EX2108, Page 42 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

CPC								
Symbol							**Type**	**Version**
F02D	/	19	/	0613			F	2013-01-01
F02D	/	19	/	0605			I	2013-01-01
F02D	/	19	/	0647			I	2013-01-01
F02D	/	19	/	0673			I	2013-01-01
Y02T	/	10	/	30			A	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	29 June 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220629

Champion - EX2108, Page 43 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	3747

INTERNATIONAL CLASSIFICATION					
CLAIMED					
F02D19/06	/	19	/	06	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747 (Primary Examiner) 29 June 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	**Art Unit**
	KEVIN A LATHERS	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		10		19		28		37						
	2		11		20		29		38						
	3		12		21		30								
	4		13		22		31								
	5		14		23		32								
	6		15		24		33								
	7		16		25		34								
	8		17		26		35								
	9		18		27		36								

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	29 June 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office Part of Paper No.: 20220629

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	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	07/21/2020	08/05/2021	06/29/2022						
	1	✓	A	=						
	2	✓	A	=						
	3	✓	A	=						
	4	✓	A	=						
	5	✓	A	=						
	6	✓	A	=						
	7	✓	A	=						
	8	✓	A	=						
	9	✓	A	=						
	10	✓	A	=						
	11	✓	A	=						
	12	✓	A	=						
	13	✓	A	=						
	14	✓	A	=						
	15	✓	A	=						
	16	✓	A	=						
	17	✓	A	=						
	18	✓	A	=						
	19	✓	A	=						

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	57	("3412258" "4287908" "4364370" "4416244" "4489699" "5555873" "5611312" "7954479" "9523497" "20070215223" "20100258099").pn.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:50 PM
L2	1402	F02D19/0613.cpc.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:51 PM
L3	2112	F02D19/0605.cpc.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:51 PM
L4	7150	F02D19/0647.cpc.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:51 PM
L5	435	F02D19/0673.cpc.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:51 PM
L6	6	(generator AND fuel AND regulator AND off-board AND stage AND line).clm.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO, JP, EP, KR); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/29 01:52 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Bibliographic Data

Application No: 16/783,455

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /KEVIN A LATHERS/ Examiner's Signature | Initials

Title: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/06/2020	123	3747	
RULE			

APPLICANTS

Champion Power Equipment, Inc., Santa Fe Springs, CA, UNITED STATES

INVENTORS

Mark J. Sarder, Waukesha, WI, UNITED STATES

Aleko D. Sotiriades, Cedarburg, WI, UNITED STATES

James J. Dehn, Brookfield, WI, UNITED STATES

Leigh Jenison, Hartland, WI, UNITED STATES

CONTINUING DATA

This application is a CON of 16191503 11/15/2018

16191503 is a CON of 14738060 06/12/2015 PAT 10221780

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

02/25/2020

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

FILING FEE RECEIVED

$785

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

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16783455
Filing Date	2020-02-06
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3412258		1968-11-19	Satter	
	2	4287908		1981-09-08	Storgard	
	3	4364370		1982-12-21	Smith et al.	
	4	4416244		1983-11-22	McDonald	
	5	4489699		1984-12-25	Poehlman	
	6	5555873		1996-09-17	Nolen	
	7	5611312		1997-03-18	Swanson et al.	
	8	7954479	B2	2011-06-07	Kojima et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.A.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16783455
	Filing Date	2020-02-06
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

	9	9523497	B2	2016-12-20	Deng	

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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
	1	20070215223	A1	2007-09-20	Morris	
	2	20100258099	A1	2010-10-14	Andersson et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

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]
	1	1826377	EP	A2	2007-08-29	Rotarex Star		
	2	2510660	FR	A1	1983-02-04	Stetter SA		
	3	H0466743	JP	A	1992-03-03	Suzuki Motor Co		
	4	1999001659	WO	A1	1999-01-14	Bailey		

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.A.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16783455
	Filing Date	2020-02-06
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

	5	2007048633	WO	A1	2007-05-03	Dirnhofer		
	6	2220679	FR	A1	1974-10-04	Servequip		

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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]
	1	Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips, January 3, 2014, https://www.youtube.com/watch?v=caZawwDaRQg	

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/KEVIN A LATHERS/	Date Considered	06/29/2022

*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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Filing Date	2020-02-06
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Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

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	/Andrew C. Stark/	Date (YYYY-MM-DD)	2022-05-10
Name/Print	Andrew C. Stark	Registration Number	65742

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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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.

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IPR2025-01463

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Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin Anthony Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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

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

37 CFR 1.8(a) **37 CFR 1.10**

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□ transmitted by facsimile to Fax No.: 571-273-8300 addressed to **Examiner Kevin Anthony Lathers** at the Patent and Trademark Office.

■ transmitted by EFS-WEB addressed to **Examiner Kevin Anthony Lathers** at the Patent and Trademark Office.

Date: May 10, 2022 /Robyn L. Templin/
Signature

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

AMENDMENT/RESPONSE TO DECISION ON APPEAL
MAILED APRIL 14, 2022

Dear Sir:

Responsive to the Decision on Appeal mailed April 14, 2022, please amend the Application as follows and consider the following remarks:

In the Claims

1. (Original) A generator and fuel delivery system comprising:

a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and

regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

2. (Original) The generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

3. (Original) The generator and fuel delivery system of claim 2 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

4. (Original) The generator and fuel delivery system of claim 1 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

5. (Original) The generator and fuel delivery system of claim 4 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

6. (Original) The generator and fuel delivery system of claim 5 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve;

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wherein, when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator; and

wherein, when the mechanical fuel valve is in the second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

7. (Original) The generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and

wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

8. (Original) The generator and fuel delivery system of claim 7, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

9. (Original) The generator and fuel delivery system of claim 8, wherein the primary pressure regulator is mounted on the regulator mounting device.

10. (Original) The generator and fuel delivery system of claim 9, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

11. (Currently Amended) A generator and fuel delivery system comprising:

a generator comprising an engine configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

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a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage; and

regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator;

wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.

12. (Original) The generator and fuel delivery system of claim 11 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. (Original) The generator and fuel delivery system of claim 12 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

14. (Original) The generator and fuel delivery system of claim 11 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

15. (Original) The generator and fuel delivery system of claim 14 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

16. (Original) A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

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

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator;

wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.

17. (Original) The dual fuel generator and fuel delivery system of claim 16 wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

18. (Original) The dual fuel generator and fuel delivery system of claim 16, further comprising a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

19. (Previously Presented) The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

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REMARKS

Claims 1-19 are pending in the present application. In the Decision on Appeal mailed April 14, 2022, the Patent Trial and Appeal Board reversed the Examiner's rejection of claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. §102(a)(1) as anticipated by Bassguitarist1985, reversed the Examiner's rejection of claims 2, 12, and 17 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985, reversed the Examiner's rejection of claims 3, 8-10, 13, and 19 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Nooutage, and reversed the Examiner's rejection of claims 5 and 15 under 35 U.S.C. §103 as being unpatentable over Bassguitaist1985 in view of Pursifull. The Patent Trial and Appeal Board did not reach the Examiner's provisional rejection of claims 1-19 on the ground of nonstatutory double patenting in view of claims 1-17, 21, and 22 of copending U.S. Patent Application No. 16/191,503.

Telephone Interview Summary

A telephone call was conducted between the undersigned and Examiner Kevin Anthony Lathers on May 5, 2022 to discuss the remaining provisional rejection of claims 1-19 on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending reference Application No. 16/191,503. The Examiner indicated that the provisional nonstatutory double patenting rejection of claims 1-19 would be withdrawn since the pending reference application has not matured to a patent and the provisional double patenting rejections are the only remaining rejections in the current application following the Decision on Appeal mailed April 14, 2022. *See* MPEP §804(I)(B)(1)(b)(iv). The Examiner also indicated that an Information Disclosure Statement (IDS) filed with the present response will be considered by the Examiner.

Applicant greatly appreciates the time taken by the Examiner to discuss the present application, and respectfully requests withdrawal of the provisional nonstatutory double patenting rejection of claims 1-19 and consideration of the IDS filed with the present response.

Claim Amendment

Claim 11 has been amended herein to change "a generator configured to operate on a gaseous fuel" to "a generator comprising an engine configured to operate on a gaseous fuel" to provide antecedent basis for "the engine". Support for the amendment can be found at least in paragraphs [0022]-[0024], and [0038] of the specification and in FIGS. 1 and 4A-4B. No new matter is added by way of the amendment.

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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 1-19.

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,

/Andrew C. Stark/

Andrew C. Stark
Registration No. 65,742
Phone 262-268-8100
acs@zpspatents.com

Dated: May 10, 2022
Attorney Docket No.: CET1090.074

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262-268-8100

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**05/10/2022 02:18:56 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60661086	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Andrew Stark

Documents

TOTAL DOCUMENTS: 11

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2022.05.10 Response to Decision on Appeal.pdf		7	-	140 KB
2022.05.10 Response to Decision on Appeal-BD.A.pdf	(1-1)	1	Amendment/Argument after Patent Board Decision	111 KB
2022.05.10 Response to Decision on Appeal-CLM.pdf	(2-5)	4	Claims	86 KB
2022.05.10 Response to Decision on Appeal-REM.pdf	(6-7)	2	Applicant Arguments/Remarks Made in an Amendment	97 KB

2022.05.10 Supp IDS.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	986 KB
FPD1-EP1826377A2.pdf	7	Foreign Reference	3583 KB
FPD2-FR2510660A1.pdf	9	Foreign Reference	959 KB
FPD3-JPH0466743A.pdf	5	Foreign Reference	704 KB
FPD4-WO1999001659A1.pdf	31	Foreign Reference	1262 KB
FPD5-WO2007048633A1.pdf	45	Foreign Reference	404 KB
FPD6-FR2220679A1.pdf	8	Foreign Reference	931 KB
NPL1-Yamaha EF2000iS Tri Fuel Conversion Overview and Installation Tips.pdf	9	Non Patent Literature	669 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2022.05.10 Response to Decision on Appeal.pdf	CA78412E5EC45CE5F6C52CE834F18F57DC48D884F1DD77C4 2218FD20E814C831385D6E232BE049F977F9B0E2E6BE8854EE 66AD1A61A23A1CC174081F015BAFD5
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2022.05.10 Supp IDS.pdf	A62FC7B9F0B808D8C003C03BD69B9D1455551899CD23EFAB E611134F4C726D78129644F0A625A2541D5176DA0650285D27 88786F98D3CCBCEB47246B6469910C
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FPD5-WO2007048633A1.pdf	354BA9FBE6516DEDC0B41922D3EBE31F7459E1E4D1637EAE A7CBFEAEFF0BADF96EFD87B0641C58D57011F7782A90FE529 6539526BC9E7B2CBB32A2C0F40F008F
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NPL1-Yamaha EF2000iS Tri Fuel Conversion Overview and Installation Tips.pdf	08C823357E7B70012B8B20CEBE4303BD0C70F6C23440ACAFD 352442C1B8F6059E545A8CF67C7239B7F6215E61DE43C2DE1 27FD59B8D88F8EC082B73B76CB48AC

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If a timely submission to enter the national stage of an international application is compliant with the conditions

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New International Application Filed with the USPTO as a Receiving Office

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	05/10/2022 02:18:56 PM ET	CET1090.074

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

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CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60661086	AUTHORIZED BY	Andrew Stark
CUSTOMER #	26629	FILING DATE	02/06/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Mark J. Sarder

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 4529	E202250E20394962	Robyn Templin

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	130.00	1	130.00
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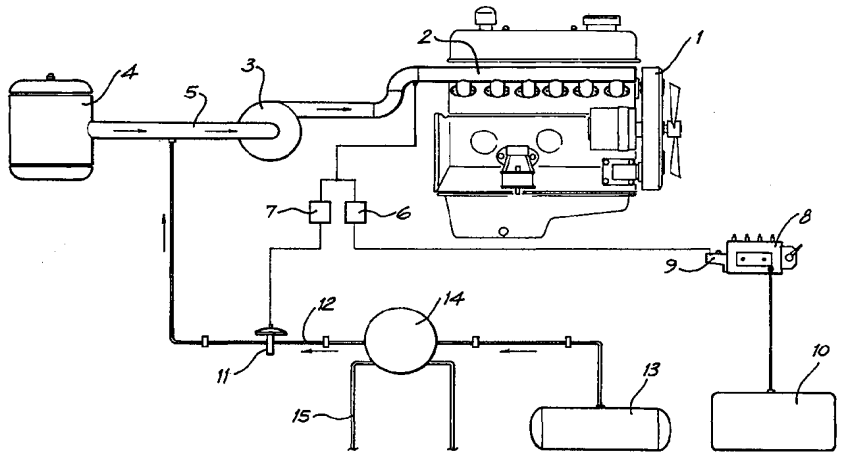
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(54) Title: A DUAL–FUEL METHOD FOR BOOST FUEL SUBSTITUTION IN TURBO–CHARGED DIESEL ENGINES

(57) Abstract

An assembly for boost fuel substitution in turbo charged diesel engines; the assembly including: a diesel engine including an inlet manifold (2) and an exhaust manifold; a turbocharger (3) in communication with said inlet manifold (2); first and second reservoirs of diesel (10) and gas (13) respectively selectively in communication with said engine; a fuel injection pump (8) including an aneroid (9) intermediate the first reservoir of diesel (10) and said inlet manifold (2); a control valve (11) intermediate the second reservoir of gas (13) and said inlet manifold (2); characterised in that the assembly includes at least two solenoids (6, 7) each capable of moving between first and second operational states; wherein a first of said solenoids (6) is located between the inlet manifold (2) and said fuel injection pump (8) and the second solenoid (7) is located between said inlet manifold (2) and said control valve (11) wherein, said first solenoid (6) responsive to a predetermined engine operating parameter moves between a first state in which pressurised air from said inlet manifold (2) communicates with said aneroid (9) and atmospheric air is isolated from the aneroid (9) and a second state in which manifold air to the fuel injection pump (8) is interrupted and atmospheric air is in communication with the aneroid (9) and pressurised air from said inlet manifold (2) terminates at said first solenoid (6); and wherein the second solenoid (7) responsive to said predetermined engine operating parameter and/or signal is located between said inlet manifold (2) and said control valve (11) and moves between a first state in which atmospheric air is in communication with said control valve (11) and second state in which pressurised air from said inlet manifold (2) is in communication with said control valve (11); wherein when the first solenoid (6) isolates said first fuel type, the second solenoid (7) operates responsive to a signal to allow boost fuel provided by said second fuel type to communicate between the second fuel source (13) and the engine.



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A DUAL-FUEL METHOD FOR BOOST FUEL SUBSTITUTION IN TURBO-CHARGED DIESEL ENGINES

BACKGROUND

The present invention relates to fuel systems and more particularly relates to a system in which a second fuel is admitted as a substitution for boost fuel in a turbo-charged diesel engine. The invention also relates to a dual fuelling system which may be retro-fitted in a simple manner to an existing single-fuel turbo-charged diesel engine.

PRIOR ART

Diesel engine operation is typically controlled by the fuel injection pump. Turbo-charged diesel engines introduce a degree of complexity to the control of the engine, over normally aspirated diesel engines due to the fact that the amount of air admitted to each cylinder for each cycle (air charge), changes as a result of the change in manifold air pressure. This change in air charge coupled to the requirement to run diesel engines lean, requires the inlet manifold pressure to be an input to any system controlling the engine. Therefore, on turbo-charged diesel engines, typically a pressure line connects the inlet manifold to an aneroid on the injection pump to facilitate the variation in fuel flow rate due to variations of inlet manifold pressure.

Other means of facilitating this variation of fuel flow rate are known. For example, one system electronically senses the manifold pressure, then the output of the electronic sensor is processed, with the output of this processor electrically driving an electromagnetic device associated with the injection pump.

US patent 4,517,928 (corresponds to Australian application 17878/83) discloses an existing system for using a gas such as LPG as a secondary boost fuel in diesel engines. According to the arrangement shown in the US patent a signal proportional to the momentary effect of fuel consumption controls the gas supply to the engine. A valve in a gas supply line is connected to a control lever of the engine governor to allow gas supply only in a load range above approximately 25% and up to a maximum of approximately 40% of the full load total fuel consumption. In the lower range, incomplete combustion

of the gas is avoided and in the high low range destination and overload are avoided and the opacity of the exhaust is improved. The consumption of liquid fuel is reduced and the exhaust gas composition is improved. An adjustable stop in the arrangement described limits the maximum injectable liquid fuel quantity when the engine is operated in a duel fuel mode. Whilst it is known to retrofit a dual fuel system incorporating diesel fuel and boost LP gas fuel as a substitution for diesel fuel, the known arrangements require considerable interference with the existing engine equipment and more particularly requires significant interference with the diesel fuel pump and aneroid. Whilst US patent 4,517,928 teaches no intervention into the inside of the fuel pump or the governor there is still required at the outside of the fuel pump a stop for a control lever. Thus, a limiter for the control rod has to be added increasing the labour in retrofitting.

Dual fuel systems used with diesel engines involve a mixture of diesel and gas wherein gas is used as boost fuel responsive to changes in a predetermined engine parameter. The principle of this system is to save diesel fuel by injecting a lesser quantity and replacing this with lower cost LPG and also to avoid diesel exhaust smoke at full load running.

This inevitably results in power loss so in order to regain the original power LPG is added to the inlet air. According to the modification is effected so that the engine will have the same power with dual fuel as if it was using a 100% diesel. At fuel engine power load about 30% diesel can be replaced. When more diesel is replaced the engine will demonstrate a phenomenon known as knocking will stop at part load where peak pressures in the cylinders are lower more diesel fuel can be replaced by LPG up to about 40%. At less than a quarter of full load of the engine no LPG may be added to the inlet system because of insufficient combustion.

INVENTION

The present invention provides an alternative boost fuel substitution system for a diesel engine which may be used in conjunction with and retro fitted to existing fuel systems.

The dual fuel system according to the present invention is characterised by the inclusion of a second fuel in place of diesel fuel which would in single fuel operation have been introduced to the engine due to an increase in the inlet manifold air pressure as a result of the turbo-charger, and an increase in throttle position, typically known as boost fuel. The system according to the present invention is particularly suitable for retro-fitting to conventional diesel engines without disassembly of the injection pump.

In one form, the invention is further characterised by the interruption of the manifold air pressure input to the injection pump, and the substitution for the variation of diesel fuel flow in dependence on manifold pressure and the metering of a second fuel in response to a chosen engine operating parameter or a combination of parameters. Suitable parameters include engine revolutions per minutes (R.P.M.), inlet manifold pressure, throttle position and diesel fuel flow rate. Preferably, the total fuel admitted to the engine is controlled so as to maintain the overall air-fuel-ratio in the lean range.

According to the present system, the signal sent to the injection pump to indicate that the manifold air pressure has increased, is interrupted. The interruption makes the injection pump behave as if the inlet manifold air pressure is close to atmospheric. This disables the ability of the injection pump to add the boost diesel fuel to the engine. The boost diesel fuel is substituted with a second fuel. The second fuel is admitted to the engine by a means other than the injection pump used for the diesel fuel. Typically, this is by a separate injection system (for direct injection) or by admission to the inlet manifold.

In one broad form the present invention comprises:

an assembly for boost fuel substitution in a turbo charged diesel engine; the assembly including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of two alternate fuel types in communication with said engine;

a fuel injection pump including an aneroid intermediate a first reservoir of one of said two fuel types and said inlet manifold;

a control valve intermediate a second reservoir of said fuel types and said inlet manifold;

characterised in that the assembly includes at least two solenoids each capable of moving between two states of operation; wherein a first of said solenoids is located between the inlet manifold and said fuel injection pump and the second solenoid is located between said inlet manifold and said control valve;

wherein, said first solenoid responsive to a predetermined engine operating parameter moves between a first state in which pressurised air from said inlet manifold communicates with said aneroid and isolates atmospheric air and a second state in which manifold air to the fuel injection pump is interrupted and atmospheric air is in communication with the aneroid and pressurised air from said inlet manifold terminates at said first solenoid;

and wherein the second solenoid responsive to said predetermined engine operating parameter or a second parameter is located between said inlet manifold and said control valve and moves between a first state in which atmospheric air is in communication with said gas metering valve and a second state in which pressurised air from said inlet manifold is in communication with said control valve and atmospheric air is isolated from control valve;

wherein when the first solenoid isolates said first fuel type, the second solenoid operates to allow boost fuel provided by said second fuel type to communicate between the second fuel source and the engine.

Preferably the aneroid is in direct contact with pressurised air from the manifold and responds to that pressure. Alternatively, the aneroid is in electrical contact with a sensor attached at or near said inlet manifold such that the sensor after sensing the air pressure in the manifold causes a signal to be transmitted to the aneroid.

In another form the present invention comprises;

an assembly for boost fuel substitution in turbo charged diesel engines; the assembly including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of two alternate fuel types in communication with said engine;

a fuel injection pump including an aneroid intermediate the first reservoir of one of said two fuel types and said inlet manifold;

a control valve intermediate a second reservoir of said fuel types and said inlet manifold;

characterised in that the assembly includes at least two solenoids each capable of moving between two states of operation; wherein a first of said solenoids is located between the inlet manifold and said fuel injection pump and the second solenoid is located between said inlet manifold and said control valve;

wherein, said first solenoid responsive to a predetermined engine operating parameter moves between a first state in which pressurised air from said inlet manifold communicates with said aneroid and isolates atmospheric air and a second state in which manifold air to the fuel injection pump is interrupted and atmospheric air is in communication with the aneroid and pressurised air from said inlet manifold terminates at said first solenoid;

and wherein the second solenoid responsive to said predetermined engine operating parameter or a second parameter is located between said inlet manifold and said control valve and moves between a first state in which atmospheric air is in communication with said gas metering valve and second state in which pressurised air from said inlet manifold is in communication with said control valve and atmospheric air is isolated from the control valve;

wherein when the first solenoid is in its second state, the second solenoid is in its second state such that when first fuel is isolated from the engine by operation of the first solenoid, the operation of the second solenoid allows delivery of boost fuel from the second fuel source to the engine.

In another broad form the present invention comprises:

a system for boost fuel substitution in a turbo charged diesel engine of the high speed type;

the system including a diesel engine including an inlet manifold and an exhaust manifold, a turbocharger in communication with said inlet manifold;

a first fuel reservoir of diesel fuel and a second reservoir of gas fuel each available for delivery to said engine;

a diesel fuel injection pump including an aneroid intermediate the first reservoir and the inlet manifold;

a gas control valve intermediate the second reservoir and the inlet manifold for regulating the pressure of gas supplied from the second reservoir;

wherein the system further includes first and second solenoids each capable of movement between two states of operation; wherein the first of said solenoids is located between the inlet manifold and said diesel fuel pump and the second is located between the inlet manifold and said gas control valve;

wherein the operation of each said solenoid is responsive to a predetermined engine operating parameter;

said first solenoid moves between a first operating condition in which the inlet manifold pressure is in communication with the aneroid and fuel pump and a second operating condition in which the inlet manifold pressure is isolated from said fuel pump limiting flow of diesel to the engine to a predetermined maximum and ambient air is accessible to the aneroid;

said second solenoid moves between a first operating condition in which gas fuel is isolated from the engine and ambient air is in communication with the gas control valve and a second operating condition in which gas fuel is in communication with said diesel engine wherein when the first solenoid is in its first operating state the second solenoid is in its first operating state and when the first solenoid is in its second operating state the second solenoid is in its second operating state;

wherein the solenoids are influenced by an electrical signal or signals initiated by a sensor or sensor which detects a predetermined engine operating parameter or parameters.

In another broad form the present invention comprises;

a system for boost fuel substitution in a turbo charged diesel engine; the system including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of diesel and gas respectively selectively in communication with said engine;

a fuel injection pump including an aneroid intermediate the first reservoir of diesel and said inlet manifold;

a control valve intermediate the second reservoir of gas and said inlet manifold;

characterised in that the system includes a single solenoid capable of moving between two operational states;

wherein said single solenoid is located intermediate the inlet manifold and the fuel pump and control valve such that the solenoid is capable of allowing communication between the first or second fuel and the engine responsive to a single dictated by a predetermined engine operating parameter;

wherein said single solenoid moves between a first operational state which allows communication between pressurised air from the inlet manifold and said aneroid and isolates pressurised air access to said gas control valve and a second operational state in which communication between the inlet manifold and the aneroid of the fuel pump is isolated and communication between the inlet manifold pressurised air and the control valve is allowed;

wherein when the solenoid is in its first operational state the first fuel is delivered to the engine and when the solenoid is in its second operational state boost fuel comprising the second fuel is substituted for the first fuel wherein the solenoid operates responsive to predetermined engine operating parameters.

The advantages of the boost fuel substitution system of the present invention, when fitted to a turbo-charged diesel engine include the following:

the process of adapting a turbo-charged diesel engine to dual-fuelled operation can be achieved without disassembly of the injection pump, nor does it require any physical alteration to the internal mechanisms of the injection pump or the body of the injection pump. Because the injection pump has not been modified, any repairs or calibration of the injection pump can still be carried out according to the manufacturer's specifications.

The system can be converted back to 100% diesel operation while the engine is in operation. Through the use of a gaseous second fuel, typically liquefied petroleum gas

or natural gas, particulate emissions can be reduced. Since only the boost component of the diesel fuel is replaced with the second fuel, knock problems associated with high substitution levels of gaseous second fuels can be avoided. This occurs due to the fact that the boost fuel flow rate typically represents less than 45% of the total fuel flow rate, based on energy flow per unit time. Knock problems associated with gaseous second fuels typically occur at higher substitution levels. Rough idle problems associated with some high substitution level, duel-fuelled engines are avoided. At idle, there is no significant boost of the inlet manifold air pressure, above ambient conditions. Therefore, at idle, the engine would be operating on or very close to 100% diesel.

The present invention will now be described in more detail according to a preferred but non limiting embodiment and with reference to the accompanying illustrations:

Figure 1: shows a schematic layout of the relationship of the duel solenoid arrangement fitted to a dual fuel system;

Figure 2: shows a cross sectional elevation of a dual change over solenoid arrangement according to a preferred embodiment wherein a first solenoid prevents communication between the inlet manifold and an aneroid and the other solenoid activates boost fuel;

Figure 3: shows the arrangement of figure 2 whereby the first solenoid allows communication between the inlet manifold and the aneroid and the second solenoid allows communication between a gas control valve and ambient air thereby preventing passage of boost fuel to the engine;

Figure 4: shows an alternative to the arrangement of figures 2 and 3 with the position of the ambient air access port in the gas circuit altered and which activates the gas fuel circuit and renders the primary fuel circuit inactive;

Figure 5: shows the solenoid arrangement of figure 4 wherein the gas fuel circuit is inactivated by the second solenoid and the first solenoid allows communication between the inlet manifold and aneroid; and

Figure 6: shows a typical circuit diagram describing electrical links between the battery source and operating solenoids.

The invention will be described, by way of example only, with reference to two embodiments for interruption to the inlet manifold air pressure input to the injection pump.

The first is one in which a connection is made between the inlet manifold, downstream of the turbo-charger, and an aneroid associated with the injection pump. The second system is one in which the inlet manifold air pressure is electronically sensed, and an electrical input is made to the injection pump.

Referring to figure 1 there is shown a schematic layout of an assembly for substitution of boost fuel in a diesel engine according to one embodiment. Figure 1 shows conventional diesel engine 1 including an inlet manifold 2 in communication with turbo charger 3. Turbocharger 3 is in communication with a conventional air cleaner 4 via air line 5.

According to a preferred embodiment, the assembly comprises co-operating dual solenoids 6 and 7 the first of which is located intermediate the inlet manifold 2 and fuel pump 8. Solenoid 6 is in communication with an aneroid 9 associated with fuel pump 8 via a pressurised air line which allows according to one embodiment aneroid 8 to detect either directly or via a signal generated by a sensor at or near the inlet manifold the level of air pressure at inlet manifold 2. Fuel pump 8 is connected to a diesel fuel reservoir 10 from which diesel fuel is delivered to the engine responsive to engine operating parameters. Solenoid 7 is in communication with inlet manifold 2 and a gas metering valve 11 which regulates flow of gas along gas supply line 12 from a reservoir 13 of LP gas which comprises the second fuel. Supply line 12 further includes a conventional converter 14 wherein LP gas is converted to a vapour in a known manner. Hot water from the engine via line 15 converts the liquid to a vapour and in doing so warms the gas from stop the unit freezing as LPG when released from the liquid state to form a gaseous state. The gas travels along line 12 towards gas metering valve 11 which is operated by a switch from the foot cycle. The switch may be one of the magnetic type or alternative form of switch to suit requirements. Once the gaseous vapour engages gas metering valve 11, turbo charger 3 at this time is not generating pressure although the foot throttle switch turns the system on at the solenoid valve downstream of gas metering valve 11.

According to one form of operation, gas metering valve 11 allows LP gas to travel responsive to the action of solenoid 7 into the engine. As the LP gas is boost fuel, no gas can enter the engine until such time as the turbo charger 3 generates enough pressure to push on a diaphragm inside gas metering valve 11 which in turn activates a plunger enabling gas feed through the metering valve. If turbo pressure is low the introduction of gas into the engine is very light but as turbo pressure increases, this will have the effect of opening gas metering valve 11 in order to increase the flow rate of gas to the engine. Thus, the turbo charger does not activate until the engine is in a high torque condition at which time the turbo charger operates. When this occurs, instead of the diesel fuel pump 8 advancing boost fuel towards the engine when gas is delivered to the engine responsive to a predetermine engine operating parameter, diesel fuel cannot enter the engine. Gas cannot enter the engine until such time as turbo charger 3 starts to operate as the torque value of the engine enters its upper range. Isolating inlet manifold air pressure from aneroid 9 of fuel pump 8 isolates diesel fuel and allows LP gas to be substituted as boost fuel. Parameters employed in the interruption of the inlet manifold air pressure input to the injection pump resulting in metering of the second fuel based on some or all of the following:

engine R.P.M, inlet manifold air pressure, throttle position, flow rate of the diesel fuel and adding the second fuel to the engine.

Figures 2 to 5 describe in more detail the operation of the dual solenoid arrangement according to a preferred embodiment of the invention.

Referring to figure 2 there is shown an enlarged cross sectional view of a dual solenoid circuit 20 which establishes intermittent links between an inlet manifold of a diesel engine and two alternative fuel sources. The dual solenoid in circuit 20 to be described below corresponds to solenoids 6 and 7 of figure 1. Dual solenoid circuit 20 includes a first solenoid 21 which is placed intermediate, engine manifold 2 and fuel pump 8 with aneroid 9. Dual solenoid circuit 20 further includes second solenoid 22 disposed intermediate inlet manifold 2 and gas metering valve 11 which controls access to a second fuel from reservoir 13. First solenoid 21 controls the passage of primary diesel fuel from reservoir 10 and interrupts the primary fuel flow circuit normally responsive to

manifold air pressure such that primary fuel may be isolated responsive to a predetermined engine parameter enabling second solenoid 22 to provide substitute boost fuel to the diesel engine. In normal operation the engine is supplied with diesel fuel from fuel source 10 with the amount of fuel delivered to the engine responsive to air pressure at the inlet manifold. The dual solenoid system which also includes turbo charger 3 operates in response to increased pressure generated by the turbo charger which is delivered to the inlet manifold 2. According to one embodiment a signal is sent to the injection pump 8 to indicate that the manifold air pressure has increased. This causes interruption to the supply of diesel fuel and isolates fuel pump 8 from manifold air pressure such that ambient air is then in communication with the aneroid 9. Solenoid 21 includes solenoid body 23 having an internal chamber 24 which, subject to the position of plunger valve 25, able to communicate with air delivery line 26, chamber 27 and pressurised air chamber 28. Solenoid 21 further includes an upper body 29 housing an actuating mechanism energised by a control circuit which is linked to the control circuit via electrical linkage 30. The actuating mechanism includes biasing spring 31 which operates responsive to an electrical signal via link 30 such that plunger valve 25 moves between a location wherein gate 32 is free of orifice 33 and bears via surface 34 on shoulder 35 of orifice 36 and a second position in which plunger 25 bears via surface 37 on shoulders 38 of orifice 33. The action of plunger valve 25 is regulated by electrical signals responsive to detection of inlet manifold pressure. As shown, plunger valve 25 of first solenoid 21 restricts the flow of pressurised air along pressurised airline 39 such that pressurised air from inlet manifold is unable to travel beyond pressurised air chamber 28. This allows ambient air to enter solenoid body 23 via port 40 such that ambient air is delivered via delivery air line 26 to aneroid 9. Accordingly the configuration of first solenoid 21 and more particularly the position of plunger valve 25 indicates that boost fuel is isolated from the diesel engine from the first fuel source in favour of substitution of boost fuel from the second fuel source. Second solenoid 22 has a similar configuration to that described for first solenoid 21 but second solenoid 22 is dispersed between inlet manifold 2 and gas metering valve 11. When first solenoid 21 isolates the fuel from a first fuel source when the aneroid detects ambient air pressure, second solenoid 22 operates to establish communication between inlet manifold 2 and second fuel or boost fuel source. As shown in figure 2 second solenoid 22 is configured

similarly to first solenoid 21 and includes solenoid body 50, ambient air chamber 51 in communication with port 52 which is open to atmospheric air and orifice 53 defined by shoulder 54 which receives oscillating plunger valve 55. Plunger valve 55 includes gate 56 which when communication is open between the boost fuel source and the inlet manifold, locates on shoulder 54. Solenoid body 50 further includes pressurised air chamber 56 which is in permanent communication with inlet manifold 2. Solenoid body 55 further includes upper shoulder 57 which acts as a bearing surface for upper surface 58 of plunger 55 when pressurised air from inlet manifold is isolated from boost fuel reservoir 13. In this configuration ambient air is available via port 52 and air chamber 51 to gas metering valve 11. When that occurs, plunger valve 25 of solenoid 21 engages shoulder region 38 via surface 37 in order to open communication between inlet manifold 2 and first fuel reservoir 10 via aneroid fuel pump.

Figure 3 shows the arrangement set out in figure 2 and is numbered in accordance with the integers of figure 2. The fundamental difference between the arrangement in figure 3 and that shown in figure 2 is that in figure 3 solenoid 21 seats on shoulder 38 via gate 32 so as to enable communication between pressurised air at the inlet manifold and the first fuel source. Sealing orifice 33 prevents ambient air access to aneroid 9 which ensures that the primary diesel fuel will be delivered to the engine. Plunger valve 25 will close access to ambient air once activated by the electrical control circuit in response to inlet manifold pressure. At the same time, second solenoid 22 closes the pressurised air circuit and allows access of ambient air via chamber 51 to gas metering valve 11. Referring to figure 4 there is shown an alternative dual solenoid arrangement 50 shown in figure 4 includes solenoid 51 which is identical to solenoid 21 shown in figure 3. Furthermore, solenoid 51 operates in an identical manner to that described for solenoid 21. Where dual solenoid arrangement 50 differs from that described in figures 2 and 3 is the arrangement of solenoid 60 which is configured differently from the corresponding solenoid 22 described in the dual solenoid arrangement 20 in figure 3. Solenoid 60 includes solenoid body 61 having an internal chamber 62, which subject to the position of plunger 63 will allow communication by air delivery line 64 between gas metering valve 11 (see figure 1) and inlet manifold 2 (see figure 1). When plunger 63 is retracted there is free communication of pressurised air between inlet manifold 2 and gas metering valve

11 and in this configuration gate 65 seats on shoulder 66 of orifice 67 isolating internal chamber 68. Solenoid arrangement 50 shows solenoid 51 isolating pressurised air in pressurised air line 69 from aneroid 9. In this configuration ambient air is in direct communication with aneroid 9 preventing flow from diesel fuel to the engine. The fundamental difference between solenoid 22 and solenoid 60 is the position of the ambient air chamber and the opposite operation of valves 56 and 63 respectively in respect of their position when pressurised air is in communication with the gas moving valve and when ambient air is in communication with the gas metering valve. These differences are merely a matter of manufacturing choice or selection enabling a possible selection of solenoids which operate differently but performing a similar roll sequentially isolating or allowing access to respective fuels.

Figure 5 shows the arrangement of figure 4 this time plungers 70 and 63 respectively are both seated against corresponding orifices as distinct from opposing orifices to allow communication between inlet manifold and aneroid 9 in the case of solenoid 51 and isolate pressurised air from inlet manifold 2 to gas control valve. Figures 4 and 5 therefore illustrate an alternative configuration for the second solenoid by virtue of the alternative location of ambient air port 71.

In a more general sense one solenoid valve may be employed to control the dual fuel system. In this case a valve which has two inputs and two outputs is used whereby the inlet manifold air pressure would be connected to the one input and atmospheric pressure would be connected to the second input. This is illustrated in Figure 7. The outputs of the valve would be connected to the aneroid associated with the injection pump, and the input to the second fuel metering system. The valve could be configured in such a way that when the valve is de-energised, the inlet manifold air pressure would be connected to the injection pump aneroid, and the gas metering system would be connected to atmospheric pressure. Typically, if atmospheric pressure is input to the second fuel metering system, the second fuel would not be admitted to the engine. Therefore, with the valve in the de-energised state, the engine would be under 100% diesel operation.

When the valve is energised, the inlet manifold air pressure would be connected to the second fuel metering system and the injection pump aneroid would be connected to atmospheric pressure, and the engine would be operating in dual-fuel mode. Since the injection pump registers the manifold pressure as being atmospheric or close to atmospheric, it will behave as if there is no boost air being admitted to the engine and will not admit boost diesel fuel to the engine.

Although this embodiment has been described with only one valve, it is acknowledged that it may be achieved with more than one valve, and it may be achieved with valves with more than two inputs, and or more than two outputs. Furthermore, the valve switching may be opposite to that described above, in that the valve can be used whereby in the energised state, the inlet manifold air pressure would be connected to the injection pump aneroid. The valve would typically be electro-mechanical, such as a solenoid so that switching the valve on and off can be achieved remotely and quickly.

In the second system, the electrical connection from the manifold air pressure sensor would be interrupted as illustrated in Figure 8. A reference signal would be sent to the processor which has the electrical properties which are characteristic of the sensor output when the inlet manifold air pressure is close to ambient.

Metering of the second fuel should be constrained to maintain the overall engine operation to be lean. This is desirable to ensure that the production of particulates is not in violation of emission control legislation. The second fuel flow may be introduced to the engine in a variety of known ways, including manifold introduction (commonly referred to as fumigated introduction for gas) or by a second injection system which may or may not be direct in-cylinder injection.

The function of the system will be described below in reference to an engine that has a connection between the inlet manifold and the aneroid associated with the injection pump. The input to the injection pump could alternatively be taken from the outlet of the turbocharger compressor.

The valve is energised when some critical constraints are met. These constraints would include some or all of the following:

Sufficient fuel level in the second fuel tank
Engine oil pressure is above a present valve
Engine R.P.M. is between set limits
Throttle position is between set limits

If the valve is energised, atmospheric air pressure is exposed to the aneroid associated with the diesel injection pump and the diesel injection pump does not admit boost diesel fuel. The second fuel metering system admits the second fuel essentially to supplement the loss of the boost diesel fuel. The metering process is done according to the engine conditions as listed above. If the valve is de-energised, the diesel pump will admit the boost diesel fuel as required. This change-over between dual-fuel operation and 100% diesel fuel operation can occur with the engine in operation.

The circuit shown in figure 6 includes a power source 80 formed by a conventional battery which may be isolated by a conventional on/off switch 81. Included in the circuit is a reset switch 82 which is in electrical communication with storage reservoir 83 via actuating solenoid 84. Another part of the circuit links relays which together link the two circuits which in turn are linked to a mercury switch 85. The mercury switch is useful should a vehicle become involved in an accident altering its attitude dramatically in which case the mercury switch will immediately isolate the system immediately shutting down the flow of electricity to the solenoid 84 on gas tank 83 preventing any further flow of liquid LPG anywhere through the system. This provides a safety feature and will minimise risk in the event of a fire. In additional to the mercury switch is pressure switch 86 which enables pressure control. This switch keeps pressure from the gas bottle at a certain level and keeps the circuit open on the energising side of relays 87. If the pressure drops off by way of a ruptured line or the like or if the vehicle runs out of gas this will immediately break the circuit and will convert the relay 87 to the off position. In this position the throttle switch 88 will be isolated which in turn will shut off the solenoid on the downstream side of the gas metering valve. If the throttle switch is

not operating because there is no power to it, the system will be immediately closed down. The circuit will also close down via the coil which operates a second relay. If there is no power to the second relay such that red indicator light comes on which indicates that the gas is off and this isolates the whole system from operating. If the gas tank is full and the circuit operates relay 1 and in turn operates relay 2, this will operate change over solenoid valve 90 and 91 thus when solenoid 90 is normally open when there is no power on it the system returns from gas operation to solely diesel fuel operation. In this condition the air pressure from the turbo charger is delivered to the aneroid on the fuel pump according to normal operation. When the turbo charger is operative and pressure is on the gas tank and the on/off switch is on, this changes a relay so that a normally closed relay opens and one normally open closes. This results in air pressure from the pressure side of the turbo charger being isolated from the aneroid and being diverted back through the system and onto the metering valve of the gas. When this happens, green light 92 illuminates on the dashboard of the vehicle indicating that gas is on. Where a driver of the vehicle puts his foot on the throttle it automatically opens the shut off solenoid on the downward side of the metering valve allowing gas to flow when the turbo charger builds up enough pressure to open the metering valve. The circuit also includes reset switch 82 just in case the vehicle runs out of gas to compensate for inability to turn the gas back on as the pressure switch has opened the circuit and no power can be delivered through the line, so it is essential to have a reset button. As soon as the reset button is activated this enables power to the tank solenoid 84 which as a consequence allows liquid to flow through the line which operates pressure switch 86. Once the operator's finger is removed from the reset button the circuit remains open because relay number 1 and number 2 are activated creating an opposite circuit effect.

It will be recognised by persons skilled in the art that numerous variations and modifications may be made tot he invention as broadly described herein without departing from the overall spirit and scope of the invention.

THE CLAIMS:

1. An assembly for boost fuel substitution in turbo charged diesel engines; the assembly including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of diesel and gas respectively selectively in communication with said engine;

a fuel injection pump including an aneroid intermediate the first reservoir of diesel and said inlet manifold;

a control valve intermediate the second reservoir of gas and said inlet manifold;

characterised in that the assembly includes at least two solenoids each capable of moving between first and second operational states; wherein a first of said solenoids is located between the inlet manifold and said fuel injection pump and the second solenoid is located between said inlet manifold and said control valve;

wherein, said first solenoid responsive to a predetermined engine operating parameter moves between a first state in which pressurised air from said inlet manifold communicates with said aneroid and atmospheric air is isolated from the aneroid and a second state in which manifold air to the fuel injection pump is interrupted and atmospheric air is in communication with the aneroid and pressurised air from said inlet manifold terminates at said first solenoid;

and wherein the second solenoid responsive to said predetermined engine operating parameter and/or signal is located between said inlet manifold and said control valve and a moves between a first state in which atmospheric air is in communication with said gas metering valve and second state in which pressurised air from said inlet manifold is in communication with said control valve;

wherein when the first solenoid isolates said first fuel type, the second solenoid operates responsive to a signal to allow boost fuel provided by said second fuel type to communicate between the second fuel source and the engine.

2. An assembly for boost fuel substitution in turbo charged diesel engines; the assembly including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of diesel and LP gas respectively in communication with said engine;

a fuel injection pump including an aneroid intermediate a first reservoir of one of said two fuel types and said inlet manifold;

a control valve intermediate a second reservoir of said fuel types and said inlet manifold;

characterised in that the assembly includes at least two solenoids each capable of moving between first and second operational states; wherein a first of said solenoids is located between the inlet manifold and said fuel injection pump and the second solenoid is located between said inlet manifold and said control valve;

wherein, said first solenoid responsive to a predetermined engine operating parameter moves between a first state in which pressurised air from said inlet manifold communicates with said aneroid and atmospheric air is isolated from the aneroid and a second state in which manifold air to the fuel injection pump is interrupted and atmospheric air is in communication with the aneroid and pressurised air from said inlet manifold terminates at said first solenoid;

and wherein the second solenoid responsive to said predetermined engine operating parameter is located between said inlet manifold and said control valve and moves between a first state in which atmospheric air is in communication with said gas metering valve and a second state in which pressurised air from said inlet manifold is in communication with said control valve;

wherein when the first solenoid is in its second state, the second solenoid is in its second state such that when first fuel is isolated from the engine by operation of the first solenoid, the operation of the second solenoid allows delivery of boost fuel from the second fuel reservoir to the engine.

3. A system for boost fuel substitution in a turbo charged diesel engine of the high speed type;

the system including a diesel engine including an inlet manifold and an exhaust manifold, a turbocharger in communication with said inlet manifold;

a first fuel reservoir of diesel fuel and a second reservoir of gas fuel each available for delivery to said engine;

a diesel fuel injection pump including an aneroid intermediate the first reservoir and the inlet manifold;

a gas control valve intermediate the second reservoir and the inlet manifold for regulating the pressure of gas supplied from the second reservoir;

wherein the system further includes first and second solenoids each capable of movement between two states of operation; wherein the first of said solenoids is located between the inlet manifold and said diesel fuel pump and the second is located between the inlet manifold and said gas control valve;

wherein the operation of each said solenoid is responsive to a predetermined engine operating parameter;

said first solenoid moves between a first operating condition in which the inlet manifold pressure is in communication with the aneroid and fuel pump and a second operating condition in which the inlet manifold pressure is isolated from said fuel pump limiting flow of diesel to the engine to a predetermined maximum and ambient air is accessible to the aneroid;

said second solenoid moves between a first operating condition in which gas fuel is isolated from the engine and ambient air is in communication with the gas control valve and a second operating condition in which gas fuel is in communication with said diesel engine wherein when the first solenoid is in its first operating state the second solenoid is in its first operating state and when the first solenoid is in its second operating state the second solenoid is in its second operating state;

wherein the solenoids are influenced by an electrical signal or signals initiated by a sensor or sensor which detects a predetermined engine operating parameter or parameters.

4. An assembly according to claim 1, 2 or 3 wherein the engine operating parameters include; engine revolutions per minute, inlet manifold pressure, throttle position and diesel fuel flow rate.

5. An assembly according to claim 4 wherein the gas control valve is located intermediate the second solenoid and said LP gas fuel source; said control valve operating in response to an electrical signal dictated by said operating parameters.

6. An assembly according to claim 5 wherein inlet manifold pressure may be determined from an outlet of said turbocharger.

7. An assembly according to claim 6 wherein inlet manifold pressure is measured by a sensor electrically connected to a circuit which includes said first and second solenoids.

8. An assembly according to claim 7 wherein the air pressure of the inlet manifold is sensed electrically by means of an electronic sensor which transmits a signal to one or both said solenoids.

9. An assembly according to claim 8 wherein the air pressure of the inlet manifold is mechanically sensed at said fuel pump.

10. An assembly according to claim 9 wherein the flow of said second fuel is regulated so as to ensure a lean mix.

11. A system for boost fuel substitution in a turbo charged diesel engine; the system including;

a diesel engine including an inlet manifold and an exhaust manifold;

a turbocharger in communication with said inlet manifold;

first and second reservoirs of diesel and gas respectively selectively in communication with said engine;

a fuel injection pump including an aneroid intermediate the first reservoir of diesel and said inlet manifold;

a control valve intermediate the second reservoir of gas and said inlet manifold;

characterised in that the system includes a single solenoid capable of moving between two operational states;

wherein said single solenoid is located intermediate the inlet manifold and the fuel pump and control valve such that the solenoid is capable of allowing communication between the first or second fuel and the engine responsive to a single dictated by a predetermined engine operating parameter;

wherein said single solenoid moves between a first operational state which allows communication between pressurised air from the inlet manifold and said aneroid and isolates pressurised air access to said gas control valve and a second operational state in which communication between the inlet manifold and the aneroid of the fuel pump is isolated and communication between the inlet manifold pressurised air and the control valve is allowed;

wherein when the solenoid is in its first operational state the first fuel is delivered to the engine and when the solenoid is in its second operational state boost fuel

comprising the second fuel is substituted for the first fuel wherein the solenoid operates responsive to predetermined engine operating parameters.

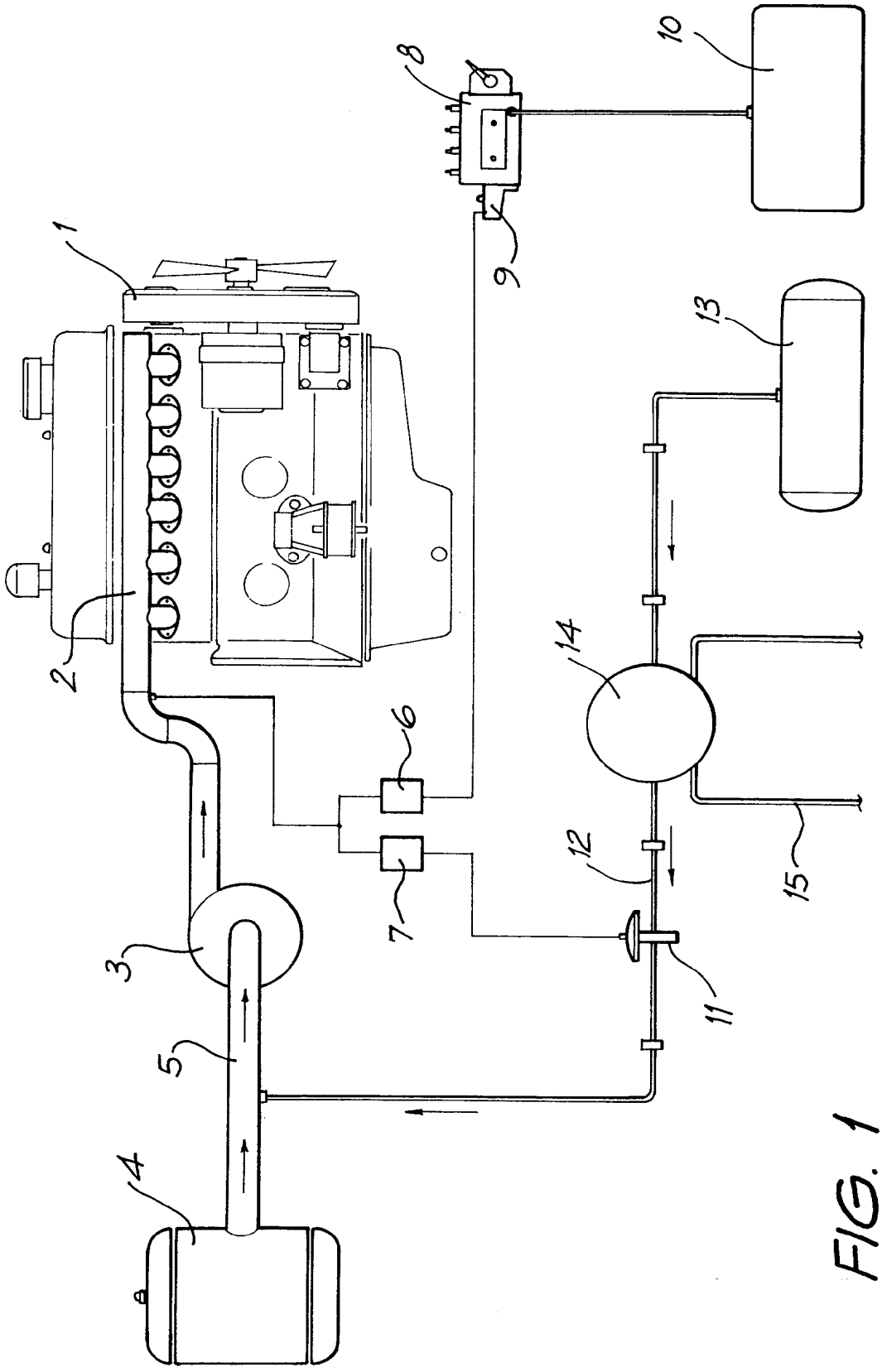


FIG. 1

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

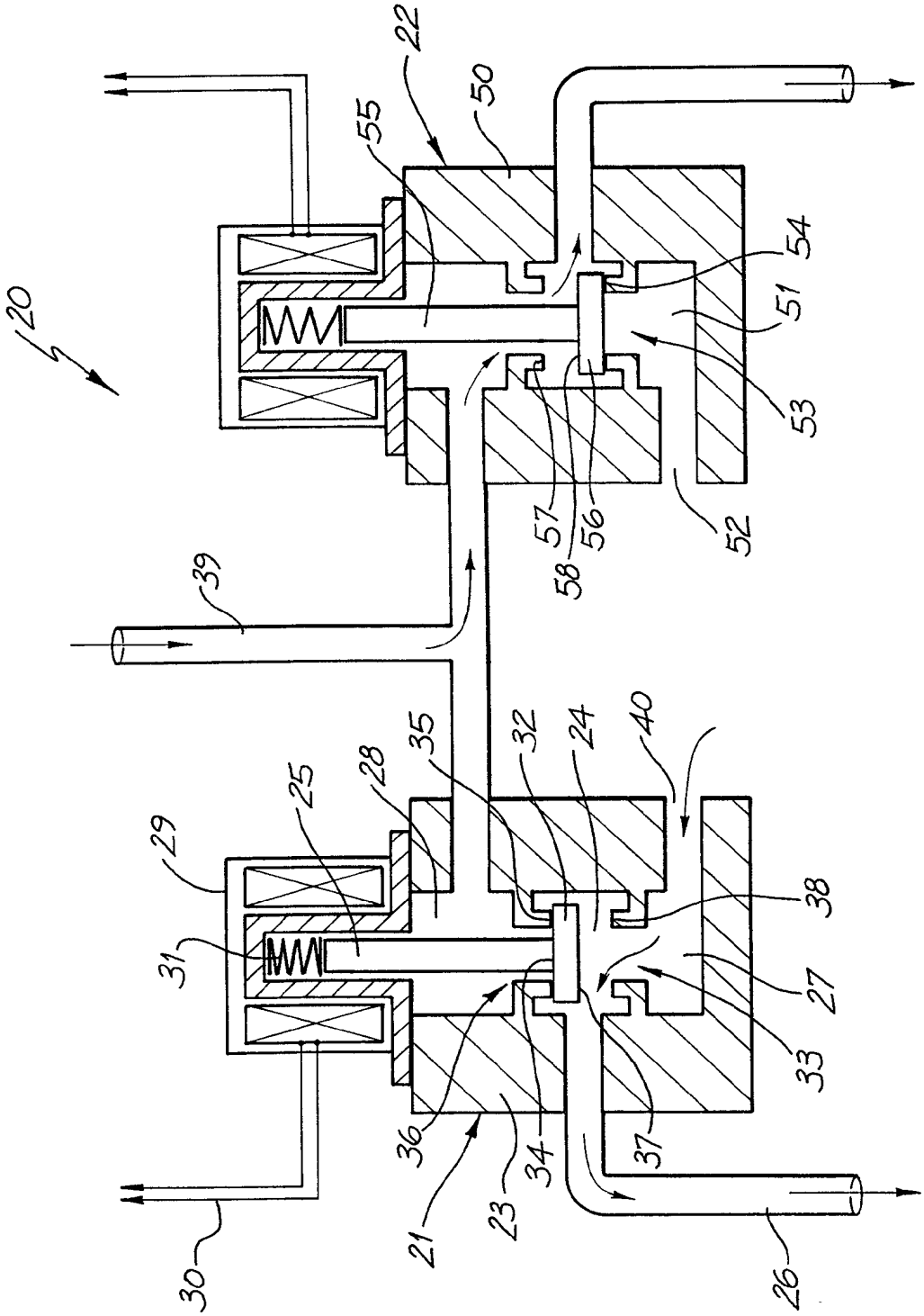


FIG. 2

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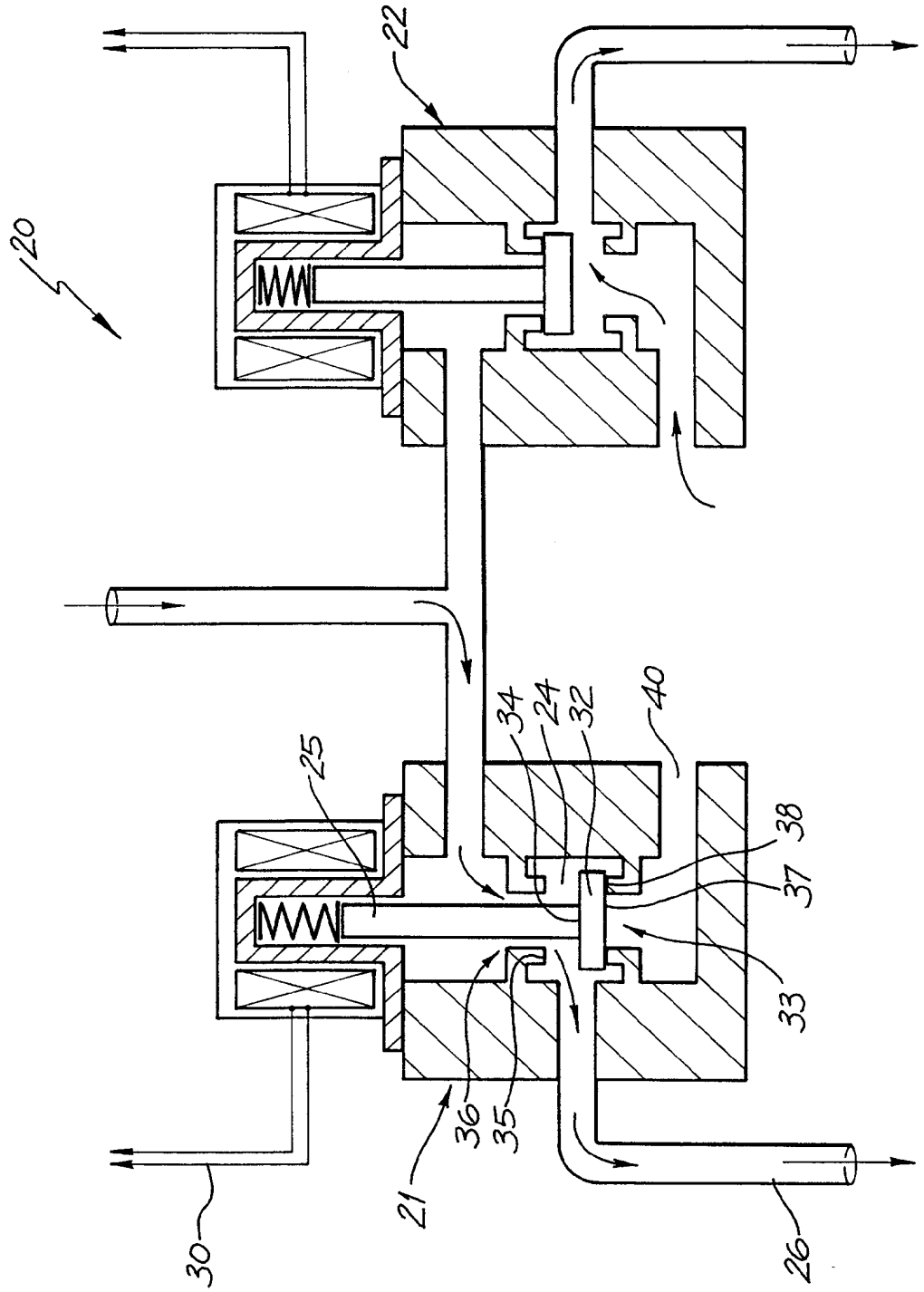


FIG. 3

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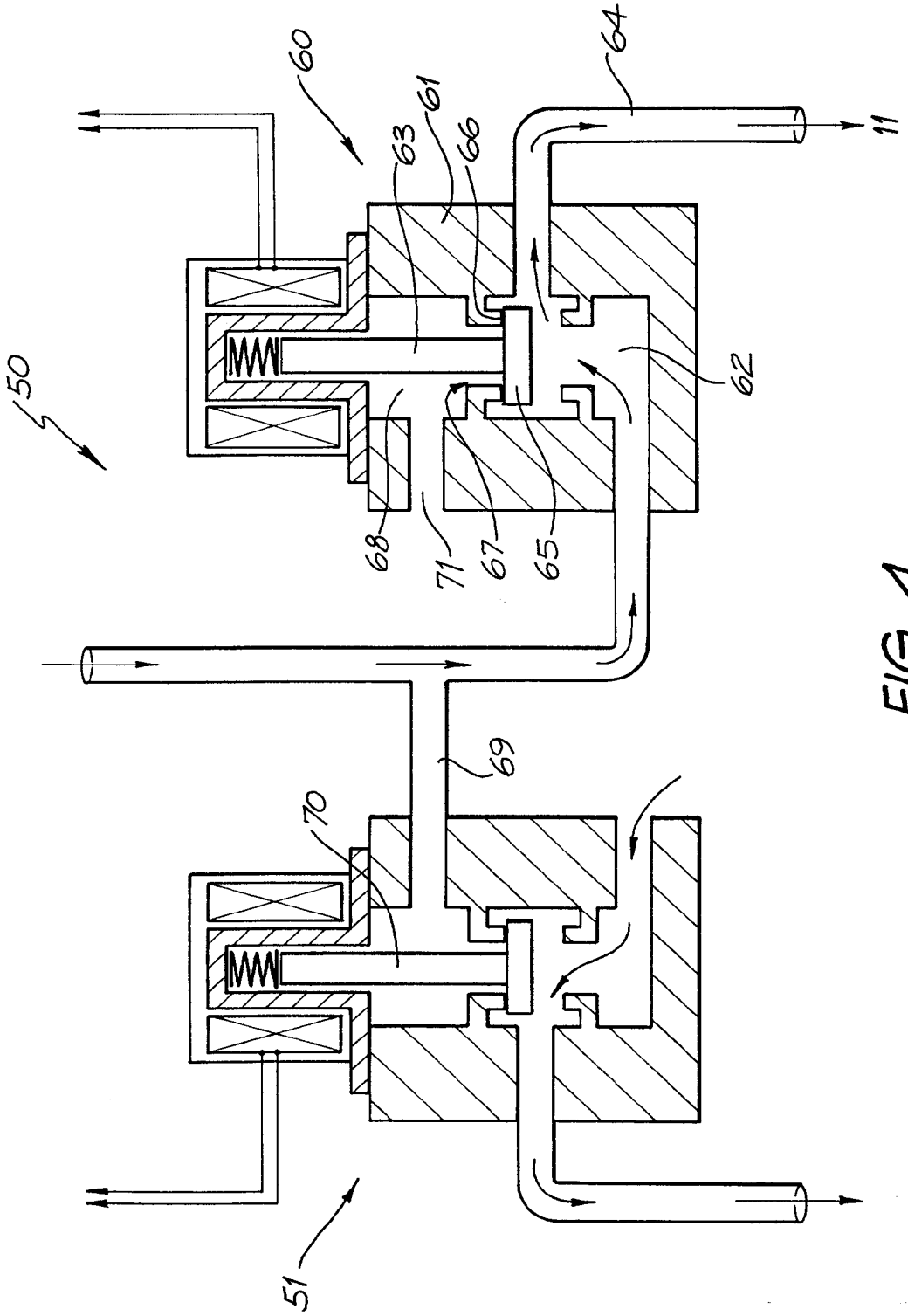


FIG. 4

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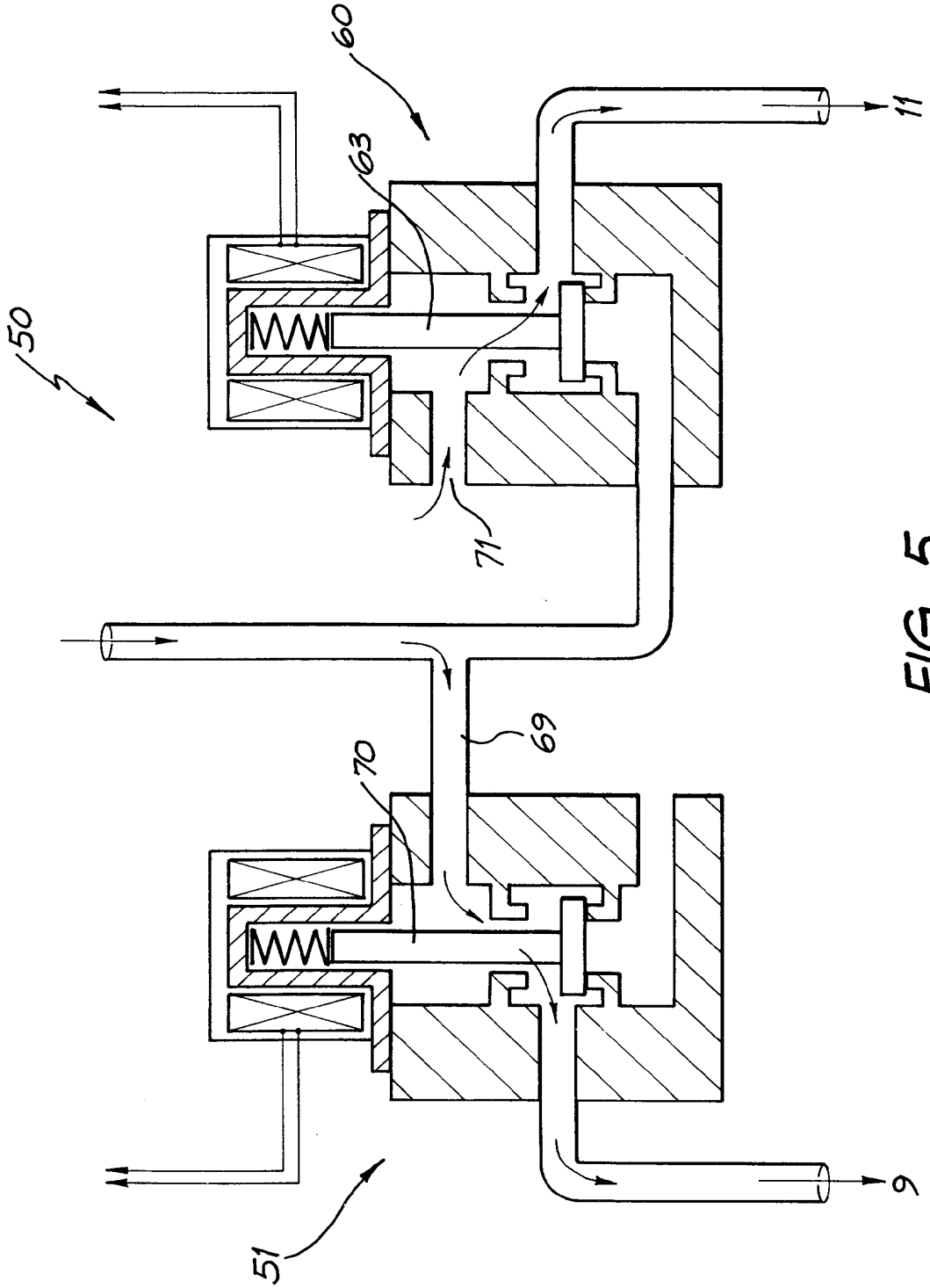


FIG. 5

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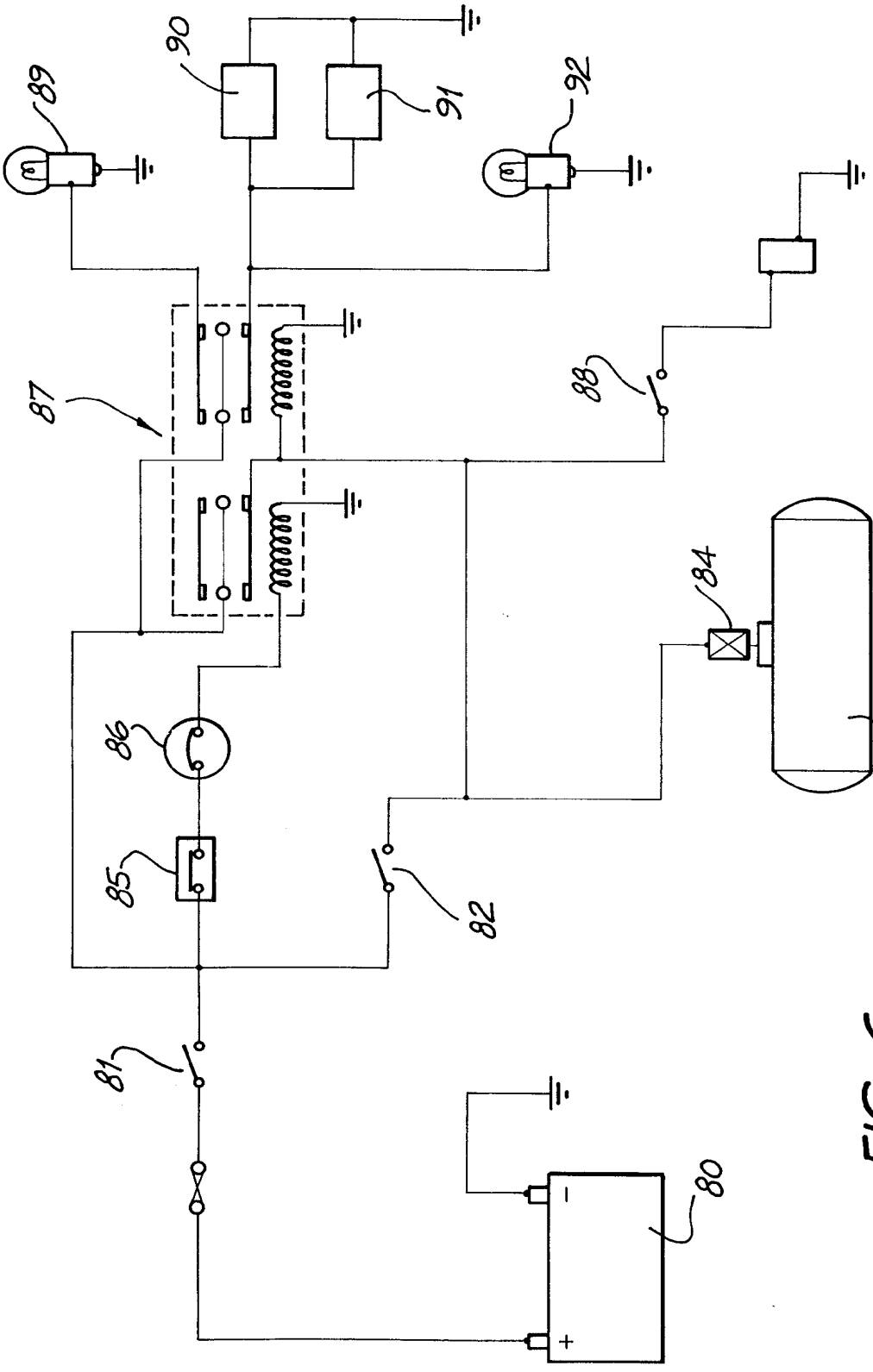


FIG. 6

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IPR2025-01463

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 98/00500

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: F02M 43/00; F02D 19/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F02M 21/02, 43/00, 02; F02D 19/08, 23/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT + keywords

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4619240 A (BEDFORD et al) 28 October 1986 whole document	
A	US 4517928 A (WOLTERS) 21 May 1985 whole document	

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
25 August 1998	28 AUG 1998
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929	Authorized officer KURT TOBLER Telephone No.: (02) 6283 2469

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 98/00500

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	4619240	CA	1226183	EP	108582		
US	4517928	AU	17878/83	BR	8304334	CA	1213484
		IN	161555	NL	8203169	ZA	8305922
						EP	102119

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(Not for submission under 37 CFR 1.99)

Application Number	16783455
Filing Date	2020-02-06
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

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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	2	4287908		1981-09-08	Storgard	
	3	4364370		1982-12-21	Smith et al.	
	4	4416244		1983-11-22	McDonald	
	5	4489699		1984-12-25	Poehlman	
	6	5555873		1996-09-17	Nolen	
	7	5611312		1997-03-18	Swanson et al.	
	8	7954479	B2	2011-06-07	Kojima et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16783455
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	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

	9	9523497	B2	2016-12-20	Deng	

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	2	20100258099	A1	2010-10-14	Andersson et al.	

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	1	1826377	EP	A2	2007-08-29	Rotarex Star		
	2	2510660	FR	A1	1983-02-04	Stetter SA		
	3	H0466743	JP	A	1992-03-03	Suzuki Motor Co		
	4	1999001659	WO	A1	1999-01-14	Bailey		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16783455
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	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

	5	2007048633	WO	A1	2007-05-03	Dirnhofer		
	6	2220679	FR	A1	1974-10-04	Servequip		

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	1	Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips, January 3, 2014, https://www.youtube.com/watch?v=caZawwDaRQg	

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	Application Number	16783455
	Filing Date	2020-02-06
	First Named Inventor	Mark J. Sarder et al.
	Art Unit	3747
	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

CERTIFICATION STATEMENT

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

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See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Andrew C. Stark/	Date (YYYY-MM-DD)	2022-05-10
Name/Print	Andrew C. Stark	Registration Number	65742

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(11) EP 1 826 377 A2

(12) EUROPEAN PATENT APPLICATION

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29.08.2007 Bulletin 2007/35

(51) Int Cl.:
F02D 19/06 *(2006.01)* *F02B 61/02* *(2006.01)*

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(22) Date of filing: **31.03.2006**

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Designated Extension States:
AL BA HR MK YU

(30) Priority: **23.02.2006 CN 200610024100**

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201300 (CN)

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(54) Fuel change-over system and change-over method for motorcycle or motor-assisted bicycle

(57) The invention discloses a fuel change-over system for a motorcycle or motor assisted bicycle. The system comprises a solenoid-actuated gasoline valve (70) for controlling opening/closing of a gasoline supply passage, a solenoid-actuated LPG valve (40) for controlling opening/closing of a LPG supply passage, a gasoline pump (80), a change-over switch (140), a control device (100), and a indication device (150). During a change-over from gasoline to LPG, the control device (100) makes the pump (80) starting and operating so that any rest gasoline in a carburetor (60) of the vehicle can be drawn by the pump (80) back to a tank (90) of the vehicle. Moreover, the invention provides a fuel change-over method for conducting a smooth fuel change-over between gasoline and LPG in a dual-fuel motorcycle or motor assisted bicycle during its running or stop time. This will be contributive to popularize motorcycles and motor assisted bicycles.

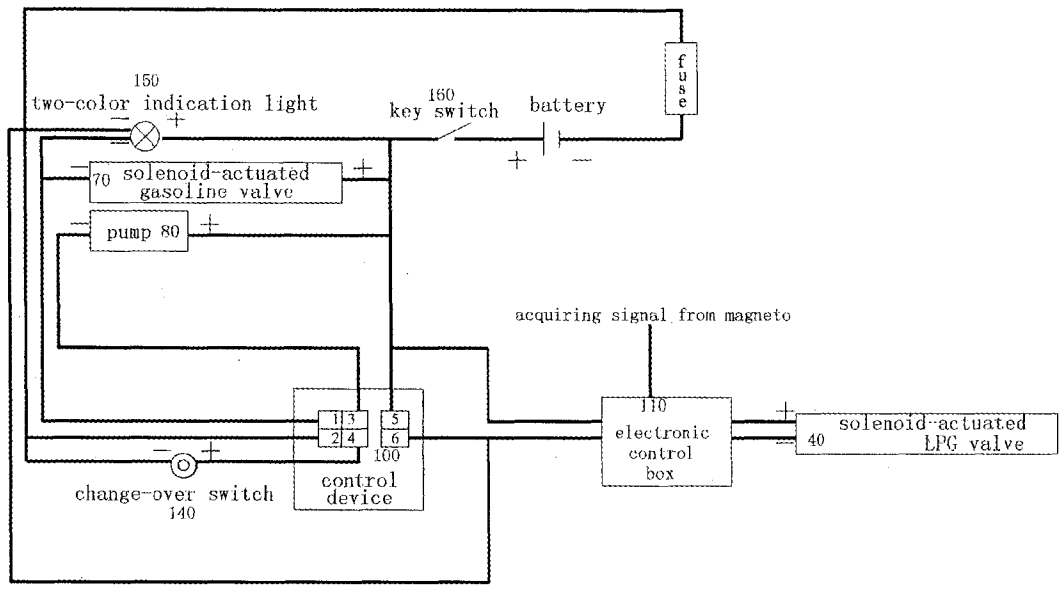


FIG. 2

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Description

Technical field

[0001] The present invention relates generally to a fuel change-over system and a corresponding change-over method thereto for a motorcycle or motor-assisted bicycle (called jointly by motorcycle(s) hereafter).

Background of the invention

[0002] Nowadays, a motorcycle which uses clean energy sources such as LPG is becoming a new popular traffic vehicle, for the emissions of the gasoline-burning motorcycles have polluted the atmosphere heavily. Therefore, a LPG-burning motorcycle is and will be in a great demand in the world market. The gas refilling of LPG motorcycles, however, is a big problem in some countries, which needs the public administrations concerned to invest finance to build sufficient LPG refilling stations and service facilities associated with them. This is a big obstacle for popularizing LPG motorcycles in some countries. If a dual-fuel motorcycle can be developed that uses LPG as a primary fuel and gasoline as a secondary one, the dual-fuel motorcycle of this type will be adopted in large amounts in the cities where there are less LPG refilling stations, it will make its users unnecessary to worry about the trouble in gas refilling, harmful emissions will be reduced, and the environmental atmosphere will be less polluted accordingly. At present, there have existed sophisticated single-fuel motorcycles, that is, gasoline burning ones and LPG burning ones, in wide use. A gasoline-burning motorcycle uses a carburetor to mix fuel with air and to form a combustible mixture, while a LPG-burning motorcycle uses a mixer to mix LPG with air. It is a difficult problem to combine a carburetor and a mixer together in a volume-limited motorcycle body, and it is another difficult problem to make a smooth change-over between the two fuels under a precondition not to influence user's riding. So far, in this field, there has not been a technology capable of solving the problems. Though some technologies for change-over between two fuels have been successfully used in the fields of cars and buses, the difference between a four-wheel vehicle and a two-wheel one is rather great, and most cars and buses are electronically fuel-injected, therefore, there is also a great difference in fuel change-over between a car and a motorcycle.

Summary of the invention

[0003] The object of the invention is to provide a fuel change-over system for conducting smooth and save changing-over between gasoline and LPG in a motorcycle.

[0004] The another object of the invention is to provide a fuel change-over system for conducting smooth and safe changing-over between gasoline and LPG during user's riding or in stop time.

[0005] The still another object of the invention is to provide a fuel change-over method for conducting smooth and safe changing-over between gasoline and LPG in a motorcycle.

[0006] In one aspect of the invention, the invention provides a fuel change-over system for conducting fuel change-over of a dual-fuel motorcycle. The system is used to conduct changing-over between gasoline supply and LPG supply and comprises: a solenoid-actuated gasoline valve for controlling opening/closing of a gasoline supply passage, it is connected at its one end to a gasoline tank and at its the other end to a carburetor; a solenoid-actuated LPG valve for controlling opening/closing of a LPG supply passage, it is connected at its one end to a LPG source and at its the other end to a mixer, and a outlet of the mixer is connected to a inlet of the carburetor; a change-over switch for conducting changing-over operation. The change-over system further comprises: a pump whose inlet is connected to the carburetor for drawing any rest gasoline in the carburetor back to the gasoline tank; a control device which is electrically connected to the pump, the change-over switch, the solenoid-actuated gasoline valve, and the solenoid-actuated LPG valve, respectively. In changing-over from gasoline to LPG, the control device makes the pump starting so as to draw any rest gasoline in the carburetor back to the gasoline tank.

[0007] In another aspect of the invention, the solenoid-actuated LPG valve is attached on a pressure reducing valve which is connected at its one end to the LPG source and at its the other end to the mixer.

[0008] In still another aspect of the invention, the mixer is connected at its outlet to an inlet of the carburetor and is provided with an air cleaner at its inlet.

[0009] In yet another aspect of the invention, the fuel change-over system is provided with an electronic control box for acquiring a signal from the magneto of a motorcycle. The electronic control box is connected with the solenoid-actuated LPG valve. When the magneto is stopped, the electronic control box transmits a control signal to make the solenoid-actuated LPG valve closed and thereby to shut off LPG supply passage.

[0010] In a further aspect of the invention, the control device further includes a condition memory device which is able to remember if gasoline or LPG is used before electrical power supply is turned off until the motorcycle and its magneto is power on and started again. The change-over switch is a two-position button switch and can be triggered by a voltage signal. The change-over switch is not triggered when the power supply of a motorcycle is turned off.

[0011] In a further aspect of the invention, the fuel change-over system further includes a fuel attribute indicator for indicating if gasoline or LPG is used at that right time. The fuel attribute indicator is electrically connected with the control device.

[0012] In a further aspect of the invention, the control

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device can control the gasoline pump so that the operation time length of the pump is proportional to the gasoline chamber volume of the carburetor.

[0013] In a further aspect of the invention, during a changing-over from LPG to gasoline, the control device controls the solenoid-actuated LPG valve so as to make it closed at a time delay; and during a changing-over from gasoline to LPG, the control device controls the solenoid-actuated gasoline valve so as to make it open at a time delay.

[0014] In a further aspect of the invention, the control device is provided with a change-over disabling device which is used to disable any following changing-over operation in a predetermined period after the last changing-over is triggered.

[0015] Furthermore, the invention provides a fuel change-over method for conducting fuel change-over in a dual-fuel motorcycle. The method comprises: during a changing-over from LPG to gasoline, as soon as the change-over switch of the change-over system is operated, the control device of the change-over system makes the solenoid-actuated gasoline valve open immediately so as to make gasoline passage through, and at the same time, the solenoid-actuated LPG valve is closed at a time delay; during a changing-over from gasoline to LPG, as soon as the change-over switch of the change-over system is operated, the control device of the change-over system makes the solenoid-actuated gasoline valve closed immediately so as to shut off gasoline passage, and at the same time, the gasoline pump in the fuel change-over system is started, and the solenoid-actuated LPG valve is opened at a time delay.

[0016] With the fuel change-over system and the fuel change-over method according to the invention, a rider can conduct a smooth fuel changing-over between gasoline and LPG during whose running or in stop time. This will be contributive to popularize motorcycles.

Brief description of drawings

[0017]

Fig. 1 is a schematic diagram of a general layout of the fuel change-over system according to the invention; and

Fig. 2 is a wiring principle diagram of the control device of the fuel change-over system according to the invention.

Detailed description of the invention

[0018] The invention is described below in detail in reference to the accompanying drawings.

[0019] Fig.1 is a schematic diagram of a general layout of the fuel change-over system for a motorcycle according to the invention, which is used for conducting changing-over between gasoline and LPG. The fuel change-over system comprises a solenoid-actuated gasoline valve 70 for opening/closing a gasoline supply passage and a solenoid-actuated LPG valve 40 for opening/closing a LPG supply passage. The solenoid-actuated gasoline valve 70 is connected at its one end to a gasoline tank 90 and at its the other end to a carburetor 60. The solenoid-actuated LPG valve 40 is attached on a pressure-reducing valve 120 which is used for adjusting LPG pressure into a mixer 50. The pressure-reducing valve 120 is connected at its one end to a LPG container 20 and at its other end to the mixer 50 which is used for mixing LPG and air. An outlet of the mixer 50 is connected to an inlet of the carburetor 60, and thereby it is possible to use a common fuel throttle wire, and an air cleaner (not shown) is provided at an inlet of the mixer 50. As shown in Fig. 1, a combination valve 30 is provided in the LPG container 20 and is connected to a LPG refilling valve 10 which is used for filling LPG into LPG container 20.

[0020] The fuel change-over system comprises a change-over switch for triggering a changing-over operation. Preferably, the change-over switch is a two-position button switch and can be triggered by a voltage signal. Thus, the change-over switch will not be triggered by a mal-operation in the case that the main power supply is turned off.

[0021] The fuel change-over system of the invention further comprises a gasoline pump 80 which is connected at its inlet to a discharge port at the bottom of the carburetor 60 and at its outlet to a gasoline tank 90 so that it can draw any rest gasoline in the carburetor 60 back to the gasoline tank 90.

[0022] Furthermore, the fuel change-over system includes a control device 100. As shown in Fig. 2, the control device 100 has six control legs, wherein leg 1 is connected to the solenoid-actuated gasoline valve 70 and can be connected in parallel with a double-color indication light 150 for indicating the condition of the solenoid-actuated gasoline valve 70, e.g. red light's lighting up indicates that the solenoid-actuated gasoline valve 70 is open and gasoline is used; leg 6 is connected to solenoid-actuated LPG valve 40 and also connected with the double-color indication light 150 for indicating the condition of the solenoid-actuated LPG valve 40, e.g. green light's lighting up indicates that the solenoid-actuated LPG valve 40 is open and LPG is used; leg 2 is connected to the negative of the battery; leg 3 to gasoline pump 80; leg 4 to the change-over switch 140; and leg 5 to the key switch 160 of a motorcycle.

[0023] The control device 100 carries out its control functions as follows: in a changing over from LPG to gasoline, as soon as the change-over switch 140 is pressed down, the control device 100 makes solenoid-actuated gasoline valve 70 open immediately so that the gasoline supply passage becomes through; meanwhile the solenoid-actuated LPG valve 40 on the pressure-reducing valve 120 is closed at a time delay and the LPG supply passage is closed at a time delay accordingly. The double-color indication light 150 gives out a red light

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in the time a motorcycle runs on gasoline. In a changing over from gasoline to LPG, as soon as the change-over switch 140 is pressed again, the control device 100 makes solenoid-actuated gasoline valve 70 closed immediately so that the gasoline supply passage shut off, and the pump 80 is put into operation for a suitable predetermined period to draw any rest gasoline in the carburetor 60 back to the gasoline tank 90 and then is stopped; meanwhile the solenoid-actuated LPG valve 40 on the pressure-reducing valve 120 is opened at a time delay and the LPG supply passage becomes through accordingly. The double-color indication light 150 gives out a green light in the time a motorcycle runs on gasoline.

[0024] In the control process described above, the length of the time delay at which the solenoid-actuated LPG valve 40 is closed or opened is dependent on the displacement volume of a specific motorcycle and on the internal configuration of the carburetor 60; the length of the period for which the gasoline pump 80 works is dependent on the size of the carburetor gasoline chamber. Generally, the larger the gasoline chamber is the longer the period for which the gasoline pump 80 shall work after the solenoid-actuated gasoline valve 70 is closed.

[0025] Preferably, the control device 100 further includes a condition memory device which is able to remember the condition in which if gasoline or LPG is used before electrical power supply is turned off until power supply is turned on again, thereby, when the motorcycle is restarted, the control device 100 can hold the motorcycle to use the fuel that was used before its electrical power supply is turned off. In the case that the change-over switch 140 is a voltage triggered button-type switch, in combination with the condition memory device, a program malfunction or mal-operation which may cause the two fuel burned simultaneously can be avoided.

[0026] Furthermore, the control system 100 includes a change-over disabling device which is used to disable any following changing-over operation in a predetermined period (e.g. 10 seconds) after the change-over switch 140 is pressed down last-time, this is to ensure that two successive fuel change-overs can not be conducted in a stipulated time length so as to avoid the program out of order and the two fuels burned simultaneously.

[0027] Moreover, in order to ensure motorcycle's stability and safety, the control device 100 of the fuel change-over system of the invention is provided with an electronic control box 110 for acquiring a signal from a magneto of the motorcycle. The electronic control box 110 is connected with the solenoid-actuated LPG valve 40. As soon as the motorcycle stops traveling and its magneto stops as well, the electronic control box 110 transmits a control signal to make the solenoid-actuated LPG valve 40 closed so as to shut off LPG passage.

[0028] In addition, as shown in Fig. 1, an additional solenoid-actuated LPG valve 130 is provided in the container which is LPG source. The valve, together and at the same time with the solenoid-actuated LPG valve 40 attached on the pressure-reducing valve 120, is controlled by the control device 100. This is advantageous to raise the safety of the whole system.

[0029] While the preferred embodiment of the invention has been described and illustrated, it is obvious that those who are skillful in this technical field can make many changes and modifications without departing from the spirit and principle of the invention. For example, the fuel change-over system according to the invention can be modified to suit motorcycles of different displacements and carburetors of different sizes by adjusting the time delay of the solenoid-actuated LPG valve 40 in the system. Therefore, the scope of the invention is only defined by the claims.

Claims

1. A fuel change-over system which is used on a dual-fuel motorcycle or motor assisted bicycle for conducting its fuel change-over, more particularly for conducting change-over between gasoline supply and LPG supply, is **characterized in that** the fuel change-over system comprises:

   a solenoid-actuated gasoline valve for controlling opening/closing of a gasoline supply passage, the solenoid-actuated gasoline valve being connected at its one end to a gasoline tank and at its the other end to a carburetor;
   a solenoid-actuated LPG valve for controlling opening/closing of a LPG supply passage, the solenoid-actuated LPG valve being connected at its one end to a LPG source and at its the other end to a mixer;
   a change-over switch for conducting changing-over operation;
   a gasoline pump which is connected at its inlet to the carburetor and at its outlet to the gasoline tank so that the pump can draw the gasoline in the carburetor back to the tank;
   a control device which is electrically connected to the pump, the change-over switch, the solenoid-actuated gasoline valve, and the solenoid-actuated LPG valve, respectively, the control device is configured to start the pump to draw the gasoline in the carburetor back to the tank as soon as the change-over switch is triggered when a changing-over from gasoline to LPG is conducted.

2. The fuel change-over system according to claim 1, wherein the solenoid-actuated LPG valve is attached on a pressure-reducing valve, and the pressure-reducing valve is connected at its one end to the LPG source and at its the other end to the mixer.

3. The fuel change-over system according to claim 1,

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wherein the mixer is connected at its outlet to an inlet of the carburetor and is provided with an air cleaner at its inlet.

4. The fuel change-over system according to claim 1, wherein the fuel change-over system is provided with an electronic control box for acquiring a signal from a magneto of a motorcycle and motor assisted bicycle, the electronic control box is connected with the solenoid-actuated LPG valve, the electronic control box transmits a control signal to make the solenoid-actuated LPG valve closed and thereby to shut off LPG passage as soon as the magneto stops.

5. The fuel change-over system according to claim 1, wherein further comprising a condition memory device which is able to remember the condition in which if gasoline or LPG is used before the electrical power supply of the control device is turned off until the power supply is turned on again, thereby, when the motorcycle or motor assisted bicycle is restarted, the control device can hold it to use the fuel that was used before its electrical power supply is turned off, the change-over switch is a voltage triggered button-type switch, which is not triggered when the electrical power supply of the motorcycle or motor assisted bicycle is turned off.

6. The fuel change-over system according to claim 1, wherein the fuel change-over system comprises a fuel attribute indicator for indicating if gasoline or LPG is used by the vehicle at that right time, the indicator is connected with the control device.

7. The fuel change-over system according to claim 1, wherein the control device can control the gasoline pump so that the length of its operation time is proportional to the gasoline chamber volume of the carburetor.

8. The fuel change-over system according to claim 1, wherein during a changing-over from LPG to gasoline, the control device controls the solenoid-actuated LPG valve so as to make it closed at a time delay; and during a changing-over from gasoline to LPG, the control device controls the solenoid-actuated gasoline valve so as to make it open at a time delay.

9. The fuel change-over system according to claim 1, wherein the fuel change-over system includes a change-over disabling device which is used to disable any following changing-over operation in a predetermined period after the last-time change-over is carried out.

10. A fuel change-over method for conducting fuel change-over of a dual-fuel motorcycle or motor assisted bicycle via a fuel change-over system, comprising:

during a changing-over from LPG to gasoline, as soon as a change-over switch of the change-over system is operated, a control device of the change-over system makes a solenoid-actuated gasoline valve thereof open immediately so as to make gasoline supply passage through, and at the same time, a solenoid-actuated LPG valve thereof is closed at a time delay; during a changing-over from gasoline to LPG, as soon as the change-over switch of the change-over system is operated, the control device of the change-over system makes the solenoid-actuated gasoline valve closed immediately so as to shut off the gasoline supply passage, and at the same time, the gasoline pump in the fuel change-over system is started to work and the solenoid-actuated LPG valve is opened at a time delay.

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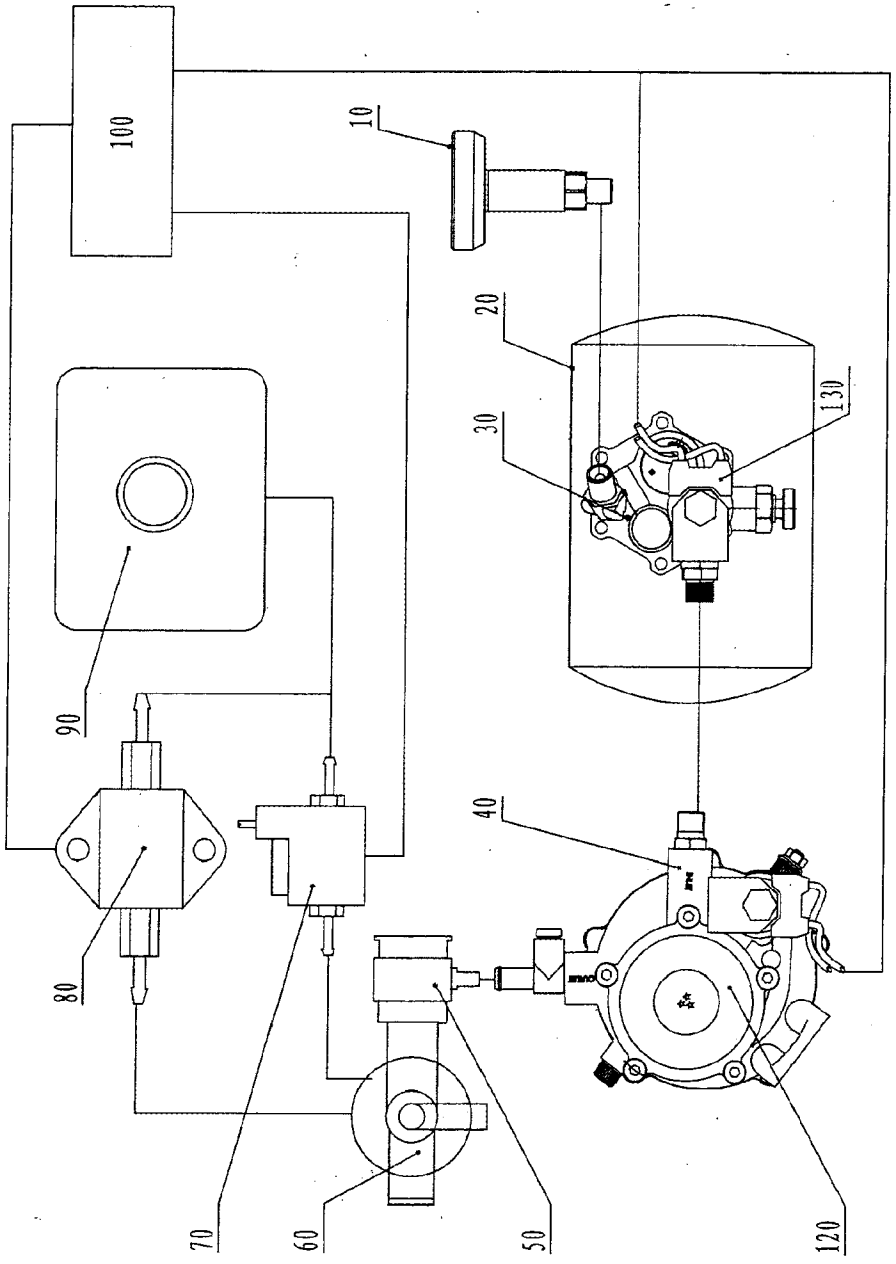


FIG. 1

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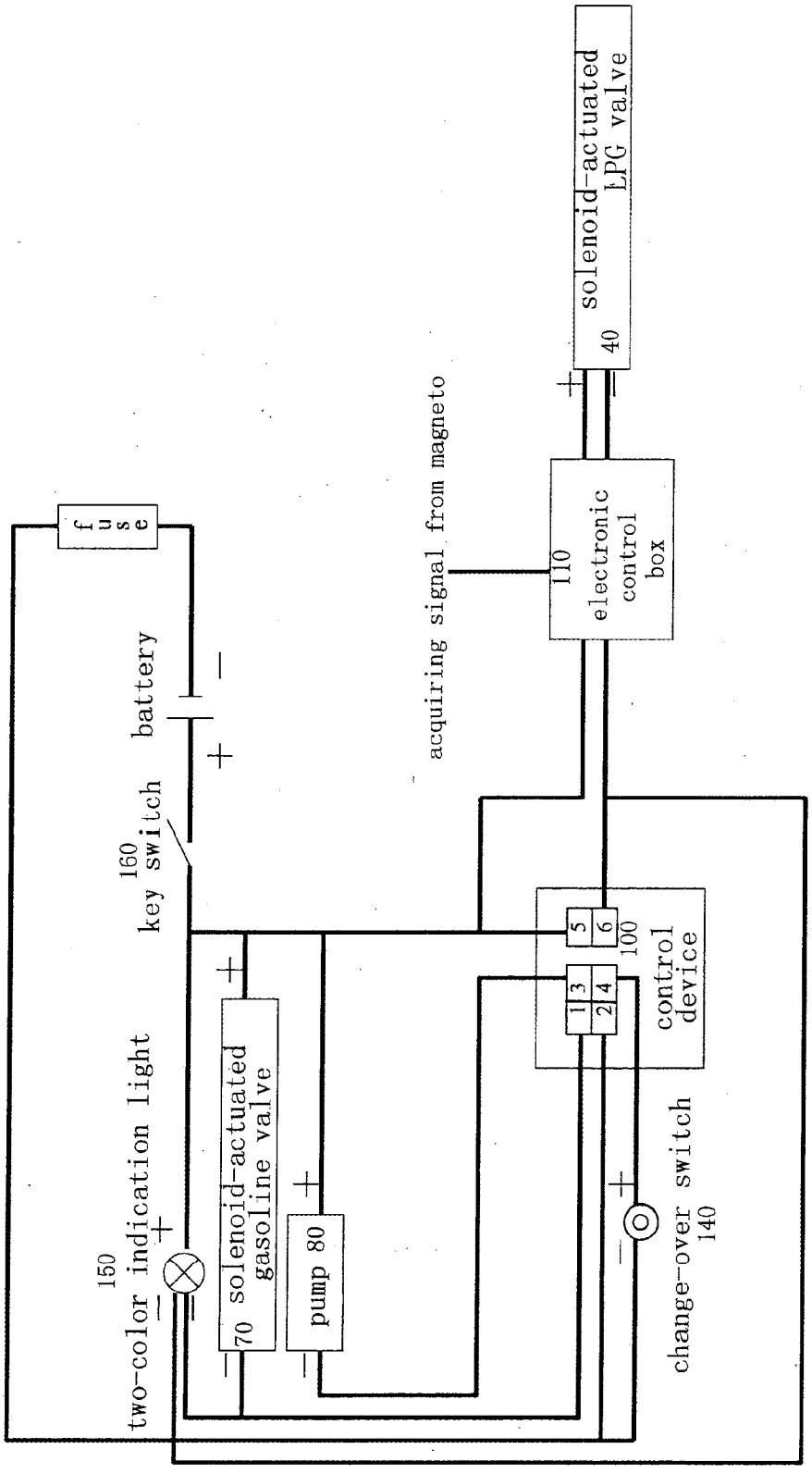


FIG. 2

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Espacenet

Bibliographic data: FR2510660 (A1) — 1983-02-04

Two-fuel reservoir system for concrete mixer trucks - uses a solenoid valve actuated by contacts on gear selector and parking brake to provide fuel source changeover

Inventor(s): DERREZ MATHIAS; LOPEZ MICHEL ± (MATHIAS DERREZ ET MICHEL LOPEZ)

Applicant(s): STETTER SA [FR] ± (STETTER SA)

Classification: **- international:** ***F02D19/06;*** (IPC1-7): B60K15/02; F02D19/06
- cooperative: **F02D19/0618 (EP)**; **F02D19/0676 (EP)**; **F02D19/0684 (EP)**; Y02T10/30 (EP)

Application number: FR19810014723 19810729

Priority number(s): FR19810014723 19810729

Abstract of FR2510660 (A1)

The fuel supply system uses two fuel tanks, each containing different fuel (1,2) and has a controller with a solenoid valve (6) which couples one of the two tanks (1,2) to the engine. The solenoid valve is operated by a relay energised through two series connected electric contacts (16,17). The two contacts are coupled to the gearbox and parking brake, so when the gear lever is placed in neutral and the parking brake engaged the fuel changeover is automatically initiated. Indicator lights (14,15) on the dashboard are supplied by auxiliary contacts (16,17) on the solenoid valve to indicate which fuel reservoir is in use.

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A1

DEMANDE DE BREVET D'INVENTION

(21) **N° 81 14723**

(54) **Système d'alimentation en carburant à deux réservoirs, pour véhicule spécial à moteur unique.**

(51) Classification internationale (Int. Cl. ³). F 02 D 19/06; B 60 K 15/02.

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Système d'alimentation en carburant à deux réservoirs, pour véhicule spécial à moteur unique.

L'invention concerne un système d'alimentation en carburant, à deux réservoirs, pour véhicule spécial à moteur unique, destiné à permettre une fonction transport avec un type de carburant et une fonction service à l'arrêt du véhicule avec un autre type de carburant.

L'invention est notamment destinée à équiper les bétonnières mobiles.

Il est connu d'utiliser, pour un même moteur, deux types de carburant au moyen de deux réservoirs et d'une commande d'inversion disposée dans le circuit d'alimentation.

De plus, on connaît des véhicules ou engins qui sont destinés à accomplir une fonction transport ou déplacement et une fonction service lorsqu'ils sont arrêtés, cette fonction étant assurée par le moteur du véhicule. C'est par exemple le cas d'une bétonnière portée par un véhicule et dont le tambour est entraîné par le moteur du véhicule.

Dans ce cas, le véhicule est une partie du temps en déplacement et une autre partie du temps sur un chantier. En déplacement, le moteur sert à la traction du véhicule et éventuellement en même temps à la rotation du tambour. Sur le chantier le véhicule est en stationnement, avec son frein de parcage actionné et sa boîte de vitesse au point mort tandis que le moteur ne sert plus alors qu'à la rotation du tambour.

Avec un double fonctionnement de ce type, il peut être avantageux d'alimenter le moteur avec des carburants différents respectivement pour la fonction transport et pour la fonction service seule. L'avantage est par exemple simplement économique, en utilisant un carburant plus lourd et moins cher pour le service seul et au contraîre plus performant pour le transport, comme par exemple respectivement du fioul et du gazole.

C'est pourquoi l'invention propose un système d'alimentation en carburant, à deux réservoirs, pour véhicule spécial à moteur unique, muni de moyens de commande pour alimenter le moteur à partir de l'un ou de l'autre desdits réservoirs et qui est remarquable en ce que les moyens de commande comportent une électro-vanne qui permet de positionner le circuit d'alimentation sur l'un ou l'autre des réservoirs et qui est actionné par un relai, lui-même commandé par les fermetures à la fois de deux

contacteurs électriques en série, lesdites fermetures étant obtenues respectivement par la mise au point mort de la boîte de vitesse du véhicule et par l'actionnement du frein de parcage de telle sorte que le moteur soit alimenté par l'un des réservoirs et un type de carburant en fonctionnement normal de transport et par l'autre réservoir et un autre type de carburant pour un fonctionnement de service seul lorsque le véhicule est à l'arrêt avec sa boîte de vitesse au point mort et son frein de parcage actionné.

Pour des raisons de sécurité il est avantageux selon l'invention que l'électro-vanne soit en position d'alimentation sur le réservoir destiné au fonctionnement transport lorsque ladite électro-vanne est au repos, c'est-à-dire non actionnée par le relais.

De préférence, dans ce cas deux témoins lumineux sont aménagés pour signaler le réservoir en fonction, ceux-ci étant électriquement alimentés par l'intermédiaire du relais qui ferme le circuit électrique du témoin destiné au réservoir de transport et ouvre le circuit électrique de l'autre témoin lorsque ledit relais est au repos, c'est-à-dire non commandé par les fermtures des contacteurs et au contraire ferme le circuit électrique du témoin destiné au réservoir de service et ouvre le circuit électrique de l'autre témoin lorsque ledit relais est excité par les fermetures en série des deux contacteurs.

L'invention sera mieux comprise à la lecture de la description qui va suivre et qui se réfère à la figure unique annexée représentant schématiquement un mode de réalisation selon l'invention pour moteur diesel.

Cette figure montre deux réservoirs 1 et 2 contenant par exemple respectivement du fioul et du gazole. De ces réservoirs partent des circuits d'alimentation munis chacun d'un préfiltre 3, 4 et pour le circuit gazole d'un dispositif anti-retour 5.

Les circuits des deux réservoirs passent par une électro-vanne 6 qui, au repos est en position d'alimentation gazole.

Après l'électro-vanne, le circuit unique parvient à la pompe d'alimentation 7 en passant par un bac de visualisation 8, visible de l'extérieur.

Après la pompe 7 le circuit aboutit aux pompes d'injection

9 après avoir traversé un filtre 10.

Comme le montre le dessin, le retour 11 des injecteurs se déverse dans le réservoir 1 de fioul et plus généralement dans le réservoir contenant le carburant le plus lourd et ceci quelque soit le réservoir sélectionné tandis que le retour 12 des pompes est recyclé en amont de la pompe d'alimentation 7.

L'électro-vanne 6 est actionnée par un relais 13 qui, au repos c'est-à-dire non excité, coupe le circuit électrique d'alimentation de l'électro-vanne qui reste alors en position d'alimentation/gazole. Dans cette position le relais ferme en outre le circuit électrique d'un témoin lumineux 14 (par exemple de couleur verte) tandis qu'il ouvre au contraîre le circuit électrique d'un autre témoin lumineux 15 (de couleur rouge par exemple).

Lorsque le relais 13 est excité comme il sera expliqué ci-après, celui-ci ferme le circuit électrique de l'électro-vanne 6 qui bascule dans sa position alimentation fioul (réservoir 1), ouvre le circuit électrique du témoin 14 qui s'éteint et ferme le circuit électrique du témoin 15 qui s'allume.

L'excitation du relais 13, comme le montre le dessin, est obtenue par la fermeture de son circuit d'alimentation électrique au moyen de deux contacteurs en série 16 et 17 qui sont combinés avec respectivement la boîte de vitesse 18 et le frein de parcage 19 du véhicule.

Les contacteurs 16 et 17 sont tels qu'ils sont ouverts lorsque respectivement la boîte de vitesse 18 est enclenchée sur une vitesse et le frein de parcage 19 n'est pas actionné et au contraîre fermés lorsque respectivement la boîte de vitesse est au point mort et le frein de parcage est actionné.

En outre l'ouverture et la fermeture du contacteur 17 entraînent respectivement l'ouverture et la fermeture du circuit électrique d'un autre témoin 20 classique de frein de parcage, de même couleur que le témoin 14.

Le fonctionnement est simple à comprendre.

En déplacement, le frein 19 n'est pas actionné et la boîte de vitesse enclenchée de telle sorte que le relais 13 n'est pas excité (les contacteurs 16 et 17 étant ouverts).

Dans ces conditions l'électro-vanne est en position

gazole, le témoin 14 est allumé et les témoins 15 et 20 éteints (conditions choisies pour le dessin). Dans ce cas, même la mise au point mort de la boîte ne change pas le type de carburant puisque le contacteur 17 reste ouvert.

Lorsque le frein 19 est actionné et que la boîte de vitesse 18 est au point mort, le relais 13 est excité de telle sorte que l'électro-vanne 6 est en position fioul tandis que le témoin 14 est éteint et les témoins 15 et 20 allumés par mise sous tension.

Cette disposition présente donc une grande sécurité et un automatisme complèt puisque les positions gazole et fioul sont automatiquement obtenues par la mise en fonction elles-mêmes, respectivement déplacement ou transport et service, le véhicule ne pouvant pas rouler sur chantier ou sur route avec du fioul (dans cet exemple). En outre en cas de défaillance électrique, les circuits restent ou passent en alimentation gazole.

Enfin, comme il a déjà été dit, l'invention est notamment destinée, mais non exclusivement, aux bétonnières portées.

REVENDICATIONS

1. Système d'alimentation en carburant, à deux réservoirs (1,2), pour véhicule spécial à moteur unique, muni de moyens de commande pour alimenter le moteur à partir de l'un ou de l'autre desdits réservoirs, système caractérisé en ce que les moyens de commande comportent une électro-vanne (6) qui permet de positionner le circuit d'alimentation sur l'un ou l'autre des réservoirs (1,2) et qui est actionnée par un relais (13) lui-même commandé par les fermetures à la fois de deux contacteurs électriques en série (16,17), lesdites fermetures étant obtenues respectivement par la mise au point mort de la boîte de vitesse (18) du véhicule et par l'actionnement du frein de parcage (19) de telle sorte que le moteur soit alimenté par l'un des réservoirs (2) et un type de carburant en fonctionnement normal de transport et par l'autre réservoir (1) et un autre type de carburant pour un fonctionnement de service seul lorsque le véhicule est à l'arrêt avec sa boîte de vitesse au point mort et son frein de parcage actionné.

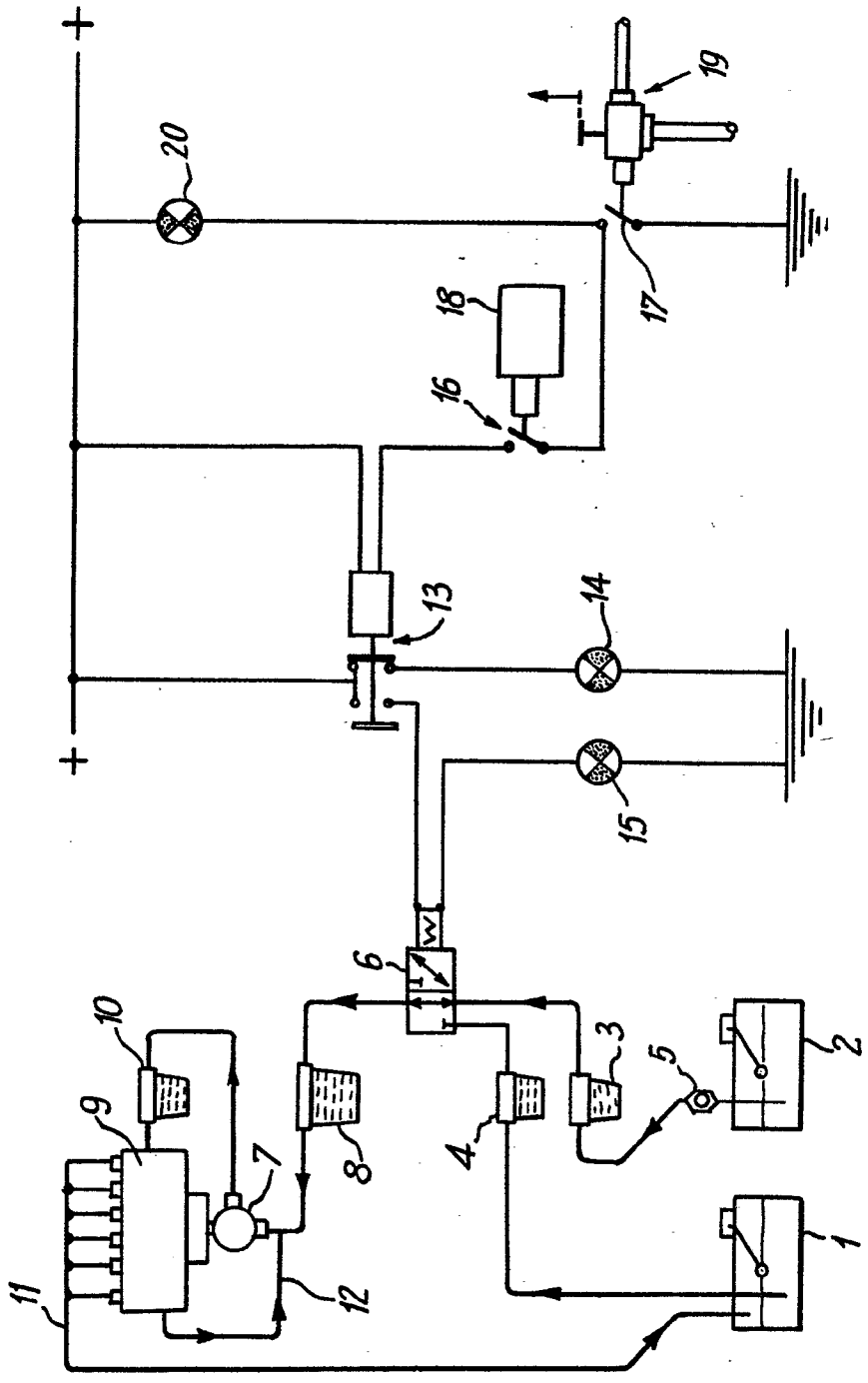
2. Système selon la revendication 1, caractérisé en ce que l'électro-vanne (6) est en position d'alimentation sur le réservoir (2) destiné au fonctionnement transport lorsque ladite électro-vanne est au repos, c'est-à-dire non actionnée par le relais (13).

3. Système selon la revendication 2, caractérisé en ce que deux témoins lumineux (14,15) sont aménagés pour signaler le réservoir en fonction, ceux-ci étant électriquement alimentés par l'intermédiaire du relais (13) qui ferme le circuit électrique du témoin (14) destiné au réservoir (2) de transport et ouvre le circuit électrique de l'autre témoin (15) lorsque ledit relais est au repos, c'est-à-dire non commandé par les fermetures des contacteurs (16,17) et au contraire ferme le circuit électrique du témoin (15) destiné au réservoir (1) de service et ouvre le circuit électrique de l'autre témoin (14) lorsque ledit relais est excité par les fermetures en série des deux contacteurs (16,17).

4. Système selon l'une des revendications 1 à 3, pour moteur diesel, caractérisé en ce que le réservoir (2) destiné à la fonction transport contient du gazole et l'autre réservoir (1) du fioul.

5. Système selon l'une des revendications 1 à 4, caractérisé en ce que le réservoir (2) de transport est muni d'un dispositif anti-retour (5), que les circuits des deux réservoirs sont munis chacun d'un préfiltre (3,4) disposé en amont de l'électro-vanne (6) et qu'un bac de visualisation (8), visible de l'extérieur est prévu dans le circuit aval de l'électro-vanne (6).

6. Système selon l'une des revendications 1 à 5 caractérisé en ce que le véhicule est une bétonnière mobile et que le moteur unique assure d'une part le déplacement du véhicule et éventuellement en même temps, la rotation du tambour lorsque ledit moteur est alimenté par le réservoir (2) de transport et d'autre part seulement la rotation du tambour lorsqu'il est alimenté par le réservoir (1) de service, c'est-à-dire lorsque ledit véhicule est en position fixe, sur chantier par exemple.


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Espacenet

Bibliographic data: JPH0466743 (A) — 1992-03-03

TWO-SORT FUEL ENGINE

Inventor(s): MAEDA TADAMASA ± (MAEDA TADAMASA)

Applicant(s): SUZUKI MOTOR CO ± (SUZUKI MOTOR CORP)

Classification: **- international:** ***F02D19/06; F02D41/14;*** (IPC1-7): F02D19/06; F02D41/14

- cooperative:

Application number: JP19900180942 19900709

Priority number(s): JP19900180942 19900709

Abstract of JPH0466743 (A)

PURPOSE:To realize a control suitable for the properties of fuels in a simple system by using a whole scope air-fuel ratio sensor, and feedback-controlling the air-fuel ratio, the ignition timing, and the like, of the other side fuel while making one side fuel as a standard, in an engine to select and use the fuel from two sorts of different fuels. CONSTITUTION:The first fuel tank 1 and the second fuel tank 2 to store the first fuel (LPG) and the second fuel (LNG) separately are provided, and at the outlets of the fuel tanks 1 and 2, the first and the second electromagnetic valves 4 and 5 converted by a manual changeover switch 3 (S1) are provided respectively. A fuel passage 6 downstream of the electromagnetic valves 4 and 5 is linked to a two-way electromagnetic valve 8 interlocked with the change-over switch 3 through a vaporizer 7, and regulators 9 and 10 to regulate the pressure of the fuels are connected to the two parts of the two-way solenoid valve 8. These regulators 9 and 10 are connected to an injector 16 through a fuel passage 13. And the output signal of a whole scope air-fuel ratio sensor S2 provided at an exhaust passage 20 are input to the ECU 24, and the control is carried out to correct the other side fuel making one side fuel as a standard.

⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　平4－66743

⑤1Int.Cl.⁵	識別記号	庁内整理番号
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19/06	B	6502－3G

⑬公開　平成4年(1992)3月3日

審査請求　未請求　請求項の数 1　（全4頁）

⑤4発明の名称　2種燃料エンジン

⑳特　願　平2－180942
㉒出　願　平2(1990)7月9日

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明　細　書

1．発明の名称

2種燃料エンジン

2．特許請求の範囲

2種の燃料タンクと、燃料の選択により各燃料タンクから選択的に燃料を供給する切換弁と、選択された燃料を調圧してエンジンの燃焼室へ燃料を供給する燃料通路と、エンジンの排気系に設けられた全領域空燃比センサと、一方の燃料を基準として他方の燃料の最適値にセッティングしたROMとを有し、前記センサの出力信号により使用燃料による空燃比を制御するようにしたことを特徴とする2種燃料エンジン。

3．発明の詳細な説明

（産業上の利用分野）

本発明は、2種の燃料を切換えて使用する2種燃料エンジンに関する。

（従来の技術）

例えば、LPG（液化石油ガス）とLNG（液化天然ガス）、LPGとH_2、H_2とLNG（またはCNG）のように2種の異なる燃料を切換えて使用するエンジンがある。

このように2種類の燃料を使用する場合、一般に両燃料ともエンジンの負圧により吸入するキャブレタ方式を採用するか、あるいは一方の燃料はインジェクションを用いて制御し、他方の燃料はキャブレタ方式を用いて制御することが多い。

また、両燃料を電子制御する場合は、既存のO_2センサを用いて制御するようにしている。このO_2センサは、試験管状のジルコニア素子の内外面に薄い白金をメッキして電極とし、素子の内外の酸素濃度差に応じて起動力が発生するようにしたものである。

（発明が解決しようとする課題）

しかるに上記の従来技術では、一方の燃料について最適に電子制御しても、他方の燃料はあくまで緊急用としてしかとらえられていないためこれ

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を最適空燃比に制御することはなされていず、またO_2センサを用いたものは、双方の燃料によってエンジンの回転数、負荷に応じた理論空燃比以外の空燃比にフィードバック制御することができなかった。

本発明はこれに鑑み、同一の全領域空燃比センサを用い、エンジンの負荷に応じた空燃比のフィードバック制御および点火時期制御を、各々セッティングされたマップおよび補正係数を使い分けて最適な空燃比制御を可能とする２種燃料エンジンを提供することを目的としてなされたものである。

（課題を解決するための手段）

上記従来技術が有する問題点を解決するため、本発明は、２種の燃料タンクと、燃料の選択により各燃料タンクから選択的に燃料を供給する切換弁と、選択された燃料を調圧してエンジンの燃焼室へ燃料を供給する燃料通路と、エンジンの排気系に設けられた全領域空燃比センサと、一方の燃料を基準として他方の燃料の最適値にセッティングしたＲＯＭとを有し、前記センサの出力信号により使用燃料による空燃比を制御するようにしたことを特徴とするものである。

（作　用）

手動切換スイッチを切換えて燃料を選択すると、選択された燃料が調圧されて燃料通路を通じエンジンの燃焼室に送られる。このとき全領域での排気中のO_2量の検出結果に基づき他方の燃料の空燃比に補正がかけられてその燃料の最適空燃比が決定される。したがって全領域の空燃比を測定するので、負荷により適切な空燃比が違ってもそれぞれの燃料に対し適切なマップ制御ができる。

（実施例）

以下、本発明を図面に示す実施例を参照して説明する。

図示の実施例はインジェクション方式のエンジンに適用した場合を示し、燃料としてＬＰＧとＬＮＧの２種の燃料を選択使用する場合を示している。すなわち第１燃料（ＬＰＧ）と第２燃料（ＬＮＧ）を別個に収納する第１燃料タンク１と第２燃料タンク２を有し、これら第１，第２燃料タンク１，２の出口部には、運転席の手動切換スイッチ３（S_1）により切換え作動され緊急遮断弁を兼ねる切換弁としての第１電磁弁４および第２電磁弁５がそれぞれ設けられている。

これら電磁弁４，５より後流側の燃料通路６はベーパーライザ７を経て前記切換スイッチ３に連動する２方電磁弁８に至り、この２方電磁弁８の一方のポートには第１燃料を整圧するレギュレータ９が接続され、他方のポートには第２燃料を整圧するレギュレータ１０が接続されており、これらレギュレータ９，１０はそれぞれ逆止弁１１，１２を介して燃料通路１３に接続され、この燃料通路１３はエンジン１４の燃焼室１５に燃料を噴射するインジェクタ１６に接続されている。前記各レギュレータ９，１０はダイヤフラム式のものが用いられ、その加圧室９ａ，１０ａにはエンジン１４の吸気通路１７の吸気圧が導入通路１８，１９を通じて導入されるようになっている。

エンジン１４の排気通路２０には、エンジン１４の回転の全領域においてO_2量を検出することのできる全領域空燃比センサS_2が設けられている。このセンサS_2は、例えば理論空燃比検出センサとジルコニア素子イオン伝導性を利用した酸素ポンプとの組合せからなっている。

第１図においてS_3は燃料通路１３に設けられた燃料温度センサ、S_4は燃料圧センサであり、またS_5は吸気通路１７に設けられた吸気圧センサ、S_6は同じく吸気通路１７に設けられた吸気温センサ、S_7は水温センサ、S_8はスロットルセンサである。また第２図において２１はディストリビュータであり、S_9はその気筒判別センサ、S_{10}はクランク角センサを示し、さらに２２はバッテリ、２３はイグニッションスイッチを示している。

ＥＣＵ２４は、全領域空燃比センサS_2により燃料の違いによる実際の空燃比から他方の燃料の空燃比センサ出力信号に補正をかけるためのＲＯＭを有している。この補正は、一方の燃料を基準とし、他方の燃料を補正するようにしている。

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いま、運転席の手動切換スイッチ３（S_1）を切換えて第１または第２燃料のいずれかを選択すると、選択された燃料の燃料タンク１または２の電磁弁４または５が開き、その燃料は燃料通路６、ベーパーライザ７を通ってその燃料用のレギュレータ９または１０を通り、こゝで整圧されて燃料通路１３へ流れ、インジェクタ１６からエンジン１４の燃焼室１５へ噴射される。このときの基本噴射量は、吸気圧センサS_5、気筒判別センサS_9により定められ、燃料温度センサS_3、スロットルセンサS_8、水温センサS_7、吸気温センサS_6、燃料圧センサS_7等により補正され、噴射量が決定される。またこれと併せてディストリビュータ２１の点火時期の決定がなされる。これらの補正は、全領域空燃比センサS_2の検出信号に基づきＥＣＵ２４により行なわれる。

そのフローは、第３図に示すように、全領域空燃比センサS_2の出力を読込み、燃料が第１燃料か否かが判断され、第１燃料であれば、その空燃比を算出し、第２燃料である場合には補正がかけられる。ついで吸気圧センサS_4、気筒判別センサS_9のデータを読込み、ブースト圧、エンジン回転数に応じ第１燃料、第２燃料それぞれの目標空燃比の選定、点火進角マップ、各種補正が行なわれ、インジェクタ操作量が決定される。

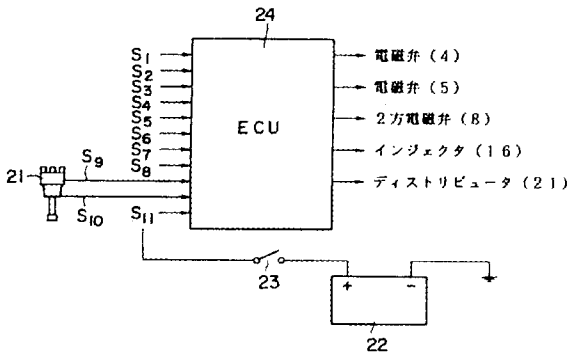
〔発明の効果〕

以上説明したように本発明によれば、２種の異なる燃料を選択して用いるエンジンにおいて、全領域空燃比センサを用い、一方の燃料を基準として他方の燃料の空燃比、点火時期等をフィードバック制御するようにしたので、各センサ、アクチュエータ等は同一で各燃料にセッティングしたマップ、補正係数を燃料切換スイッチの信号によって切換使用することが可能となり、簡単なシステムによりそれぞれの燃料の特性に合った空燃比、点火時期を決定することができる。

４．図面の簡単な説明

第１図は本発明を適用した２種燃料エンジンのシステム図、第２図は同ＥＣＵの入出力信号を示す説明図、第３図は同フローチャートである。

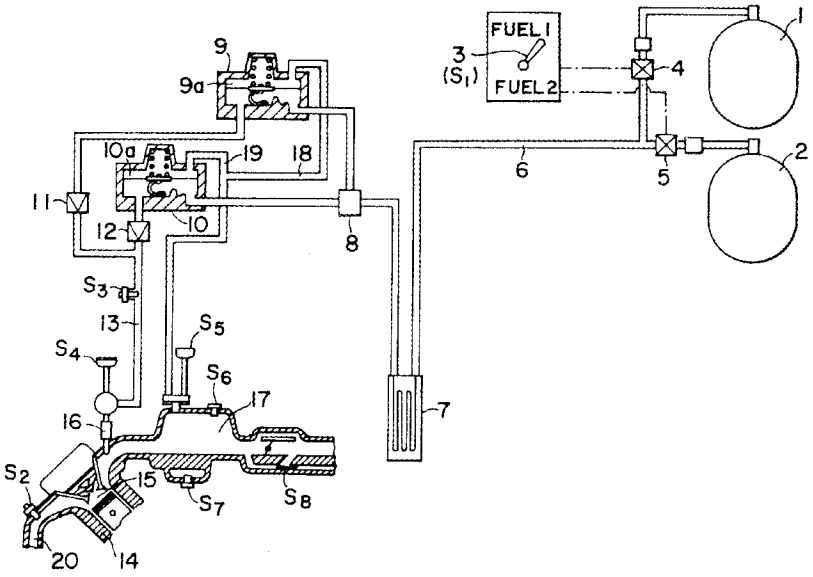
１…第１燃料タンク、２…第２燃料タンク、３（S_1）…燃料切換スイッチ、４，５…電磁弁、６，１３…燃料通路、７…ベーパーライザ、８…２方切換弁、９，１０…レギュレータ，１４…エンジン、１５…燃焼室、１６…インジェクタ、１７…吸気通路、２０…排気通路、２１…ディストリビュータ、S_2全領域空燃比センサ、S_3…燃料温度センサ、S_4…燃料圧センサ、S_5…吸気圧センサ、S_6…吸気温センサ、S_7…水温センサ、S_8…スロットルセンサ、S_9…気筒判別センサ、S_{10}…クランク角センサ。



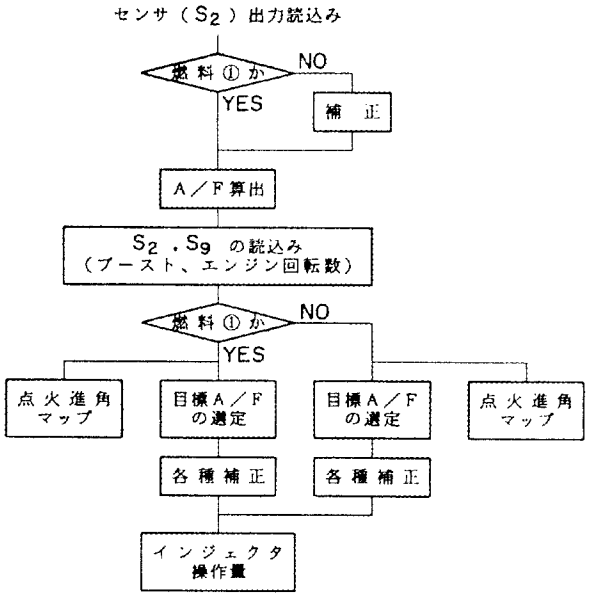
第２図

出願人代理人　佐　藤　一　雄

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第１図



第３図

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(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

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(74) **Anwalt: WINTER BRANDL FÜRNISS HÜBNER RÖSS KAISER POLTE - PARTNERSCHAFT - PATENT- UND RECHTSANWALTSKANZLEI;** Alois-Steinecker-Strasse 22, 85354 Freising (DE).

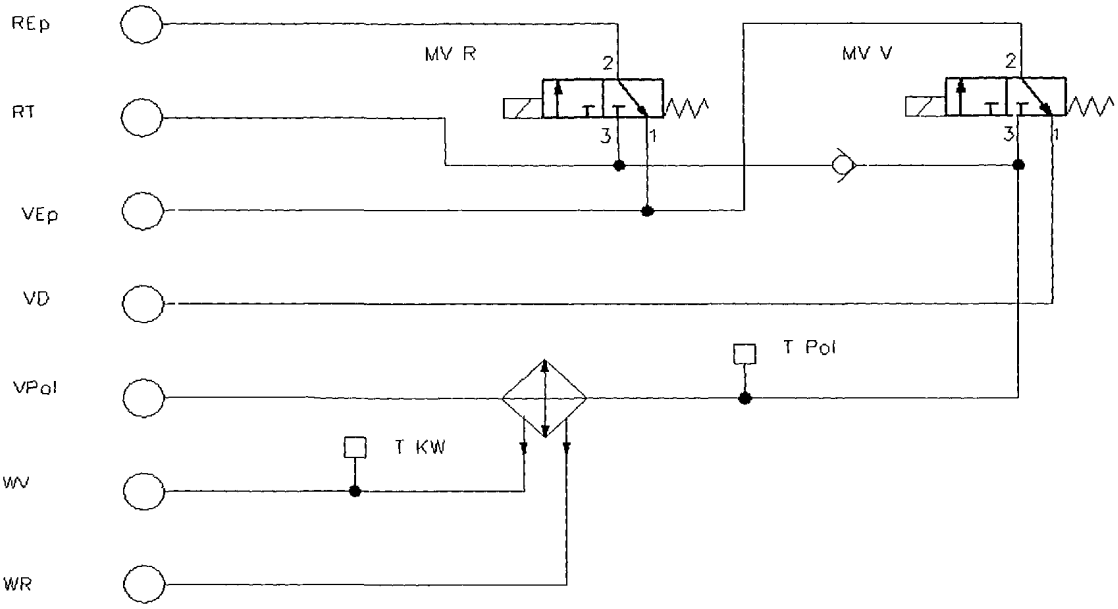
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[Fortsetzung auf der nächsten Seite]

(54) Title: RAPE/DIESEL VALVE

(54) Bezeichnung: RAPS-/DIESELVENTIL



(57) **Abstract:** In an internal combustion engine which is designed for Operation with a plurality of fuels, the entire fuel supply from at least two tanks for fuels having different flow properties is controlled in a Single valve control block. One of the fuels can be used without problems only at higher temperatures than the other one and therefore has to be heated first of all. The valve control block is arranged firstly close to the engine block of the internal combustion engine and secondly in the vicinity of a heat exchanger. As a result of the compact design, the ease of both maintenance and installation of the fuel supply System is improved and the fuel which is to be heated can be heated more rapidly.

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EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Veröffentlicht:

— *mit internationalem Recherchenbericht*

— *mit geänderten Ansprüchen*

Zur Erklärung der Zweibuchstaben Codes und der anderen Abkurzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT Gazette verwiesen

(57) Zusammenfassung: In einer für den Betrieb mit mehreren unterschiedlichen Kraftstoffen ausgelegten Brennkraftmaschine wird die gesamte Kraftstoff zufuhr aus mindestens zwei Tanks für Kraftstoffe mit unterschiedlichen Fließeigenschaften in einem einzigen Ventilsteuerblock gesteuert Einer der Kraftstoffe kann erst bei höheren Temperaturen als der andere problemlos eingesetzt und muss daher zunächst aufgeheizt werden Der Ventilsteuerblock ist einerseits eng am Motorblock der Brennkraftmasσhine und andererseits in der Nahe eines Wärmetauschers angeordnet Durch den kompakten Aufbau kann sowohl die Wartungs und Monta gefreundlichkeit der Kraftstof fversorgungsanlage verbessert als auch der aufzuheizende Kraftstoff schneller aufgeheizt werden

Raps-/Dieselventil

Die Erfindung betrifft eine Kraftstoffversorgungsanlage für einen Verbrennungsmotor, der wahlweise mit unterschiedlichen Kraftstoffen betreibbar ist. Kraftstoff 1 ist der vom Hersteller vorgesehene Kraftstoff, beispielsweise Diesel, für den das Fahrzeug konstruiert wurde. Kraftstoff 2 ist ein alternativer Kraftstoff (zumeist Pflanzenöl) , der bedingt durch seine physikalischen und chemischen Eigenschaften nur dann problemlos zum Einsatz kommen kann, wenn man bestimmte Betriebszustände mit Kraftstoff 1 abdeckt.

Insbesondere betrifft die Erfindung eine Kraftstoffversorgungsanlage mit einer Ventilvorrichtung zum Umschalten zwischen herkömmlichem Dieselkraftstoff und aus nachwachsenden Rohstoffen erzeugtem Kraftstoff wie Rapsöl oder anderen pflanzlichen Ölen.

Im Stand der Technik sind Vorrichtungen bekannt, um einen Motor mit unterschiedlichen Kraftstoffen, zum Beispiel Diesel und Rapsöl, zu betreiben. Würde ein herkömmlicher Selbstzündermotor nur mit Rapsöl betrieben, träte unter anderem das Problem auf, dass Rapsöl erst bei höheren Temperaturen dünnflüssig genug ist, um in einem solchen Motor in den Brennraum gefördert zu werden. Weiterhin ist das Einspritzsystem herkömmlicher Dieselmotoren nicht für zähflüssigen Kraftstoff konzipiert. Zudem gelangt, wenn der Motor kalt ist, mehr Treibstoff in das Motoröl, weil die Spaltmaße von Kolbenringen noch nicht perfekt passen-. Pflanzenöl verdampft dann aber – im Gegensatz zu Diesel – nicht mehr, so dass das Motoröl beeinträchtigt werden kann. Bei kalten Kolbenaußenwänden ist die Verbrennung schlechter. Es könnten sich bedingt durch Pflanzenöl vermehrt Ablagerungen bilden.

Erst bei einer Kraftstofftemperatur von mindestens ungefähr 60°C sind die Fließ- und Verbrennungseigenschaften von Rapsöl als einem Beispiel für pflanzliche Kraftstoffe mit denen von Diesel vergleichbar. Daher werden herkömmliche Rapsölmotoren beim Starten mit Diesel aus einem ersten Tank betrieben, bis sie warmgelaufen sind. Gleichzeitig wird mit der Abwärme der Motoren über einen Wärmetauscher ein zweiter Tank, der Rapsöl enthält, sowie die Zuführleitungen vom zweiten Tank zum Motor aufgewärmt, beispielsweise indem das Kühlwasser vom Motor den Tank und die Zuführleitungen aufheizt. Sobald die Temperatur des Rapsöls hoch genug ist, beispielsweise bei ungefähr 60°C liegt, wird die Versorgung des Motors mit Diesel gestoppt und der Motor stattdessen mit Rapsöl versorgt. Diese Umschaltung von Diesel auf Rapsöl kann von Hand vorgenommen werden, indem ein entsprechendes Ventil in der Zuführung umgelegt wird. In modernen Anlagen wird die Umschaltung automatisch durchgeführt, sobald der pflanzliche Kraftstoff aufgeheizt ist.

Neben der Fließfähigkeit ändern sich beispielsweise auch die Verbrennungseigenschaf ten abhängig von der Betriebstemperatur des pflanzlichen Kraftstoffes. Daher reicht es nicht aus, lediglich den Kraftstoff vorzuheizen, sondern der Motor muss zunächst mit dem Kraftstoff auf Betriebstemperatur gebracht werden, für den er ursprünglich ausgelegt wurde. Dann sind alle Bestandteile auf ideale und materialschonende Betriebsbereit schaft gebracht, und das Umschalten kann erfolgen, ohne dem Motor oder anderen Bauteilen Schaden zuzufügen.

In Fahrzeugen mit derartigen für wechselnde Kraftstoffe vorgesehenen Motoren, wie beispielsweise in der DE 38 00585 A1 oder der DE 101 54 455 A1 beschrieben, werden die Kraftstoffe über getrennte Zuleitungen mög-

liehst bis an das Einspritzsystem herangeführt. Dadurch wird eine Vermischung der Kraftstoffe weitgehend vermieden. Lediglich die Einspritzpumpe selbst und eine sehr kurze gemeinsame Zuführung zu der Pumpe muss von beiden Kraftstoffen genutzt werden. Beim Abschalten des Motors wird diese gemeinsame Zuführung wieder mit Dieselkraftstoff gespült bzw. gefüllt, um sicherzustellen, dass beim nächsten Kaltstart kein zähflüssiges Rapsöl in diesem Bereich den Durchfluss von Diesel behindert .

Speziell nach der DE 101 54 455 A1, die als nächstkommender Stand der Technik angesehen wird, gegen die der Anspruch 1 der Erfindung abgegrenzt ist, wird versucht, beide Kraftstoffe möglichst weitgehend in separaten Leitungen bis zu den Einspritzdüsen zu führen. Dies soll so weit gehen, dass für jeden Kraftstoff ein Einspritzsystem inklusive Einspritzdüse pro Zylinder vorgesehen ist, um jederzeit ohne Probleme zwischen den Kraftstoffen umschalten zu können und so das Spülen der Motoren mit Diesel nach dem eigentlichen Abschalten zu unterbinden.

Falls wie üblicherweise nur ein Einspritzsystem pro Zylinder vorhanden ist, werden die Kraftstoffe über getrennte Leitungen zu einem oder mehreren Umschaltventilen zugeführt. Von den Umschaltventilen führt eine (kurze) gemeinsame Leitung zu dem Einspritzsystem je Zylinder, wie oben beschrieben. Daher müssen für jeden Motoraufbau die Ventilanordnung, Kraft Stoff leitungen und eventuelle Steuerleitungen für die automatische Umstellung der Ventile angepasst und eingebaut werden; idealerweise werden sogar zwei Einspritzsysteme pro Zylinder vorgesehen. Dies führt zu weitgehender Neukonzeption des Motors oder zumindest zu hohem Umbauaufwand. Zudem ist von Nachteil, dass derartige Systeme in der Regel mit flexiblen Schläuchen aufgebaut sind, die mehrere Zwischenstücke erforder-

lieh machen, die – zumindest bei automatisierter Montage – aufwändig zu montieren und abzudichten sind.

Daher ist es eine Aufgabe der vorliegenden Erfindung, eine Kraftstoffversorgungsanlage zu schaffen, die mindestens zwei verschiedene Kraftstoffe sicher zuführt und hilft, Leckageverluste zu vermeiden. Zudem soll der Montageaufwand deutlich reduziert werden.

Erfindungsgemäß wird diese Aufgabe dadurch gelöst, dass ein Ventilsteuerblock vorgesehen wird, in den Kraftstoff Zuleitungen von den Tanks münden und der die Kraftstoffe über weitere Leitungen an die Einspritzdüsen verteilt. Alle Ventile zum Umschalten zwischen den zwei Kraftstoffen, beispielsweise von Diesel- auf Pflanzenölbetrieb, sind in diesen Block integriert.

Dadurch wird die Anzahl der Übergänge und Schlauchanschlüsse für die Kraftstoffe deutlich reduziert, so dass die Leckagegefahr durch Risse in Schläuchen und undichte Übergänge deutlich reduziert ist.

Besonders bevorzugt wird der Ventilsteuerblock mit einer Steuerung kombiniert . Diese Steuerung kann dann die Kraftstoffversorgung automatisch steuern, wie nachstehend noch genauer erläutert wird. Wenn alle Ventile zur Umschaltung zwischen den Kraftstoffen in dem stabilen Ventilsteuerblock integriert sind, kann die Steuerung über mehr oder weniger fest verlegte Leitungen die Ventile ansteuern. Besonders bevorzugt sind auch die wesentlichen Elemente der Steuerung wie eine programmierbare Rechenеinheit mit Speichereinheiten mit dem Ventilsteuerblock verbunden. Diese Recheneinheit kann in der Fahrgastzelle angeordnet bzw. mit Ein- und Ausgabeeinheiten in der Fahrgastzelle verbunden sein. Hier können dem Fahrzeugführer eventuell relevante Daten angezeigt werden, beispielsweise, mit welchem Kraftstoff er gerade fährt, die

Kraftstofftemperatur, die bisherige Fahrtdauer mit diesem Kraftstoff usw. Dadurch erhält man eine sehr kompakte und sehr zuverlässige Steuerung, bei der zudem die gesamte Verdrahtung zwischen der Steuereinheit und den Ventilen in einem einzigen Kabelbaum geführt werden kann, was ebenfalls zur Montagefreundlichkeit beiträgt.

Nach einer weiter bevorzugten Ausführungsform wird der Ventilsteuerblock aus wärmeleitendem Material, beispielsweise aus Metall, hergestellt.

Durch den Ventilsteuerblock fließen, wie vorstehend erläutert, beide Kraftstoffe. Wenn der Ventilsteuerblock möglichst nahe am Motor angebracht wird, kann die Abwärme des Motors den Block aufheizen. Wenn dieser die Wärme gut leitet, heizt er folglich auch den darin befindlichen Kraftstoff auf. Dadurch wird das Aufheizen beschleunigt und es kann schneller auf den weniger fließfähigen Kraftstoff umgeschaltet werden. Ferner kann der weniger fließfähige Kraftstoff mit einer geringeren Temperatur bis zum Ventilsteuerblock gefördert werden. Dies ist möglich, weil die Zuleitungen vor dem Ventilsteuerblock größere Querschnitte aufweisen als die Zuleitungen zu den Zylindern und insbesondere in den Einspritzdüsen nach dem Steuerblock, so dass eine Verstopfung weniger wahrscheinlich ist als in den Zuleitungen zu den Zylindern und zudem diese Zuleitungen bereits beim Umrüsten auf den zweiten Kraftstoff entsprechend ausgelegt werden können.

Nach einer weiter bevorzugten Ausführungsform ist der Ventilsteuerblock möglichst nahe bei einem Wärmetauscher angeordnet, der die Aufgabe hat, den weniger fließfähigen Kraftstoff zu erwärmen.

Standardmäßig werden in Motoren zur Verbrennung weniger fließfähiger nachwachsender Rohstoffe Wärmetauscher

eingebaut, die über das Kühlwasser des Motors den Tank mit dem weniger fließfähigen Stoff vorwärmen.

Bei der vorteilhaften Ausführungsform der Erfindung findet dieses Vorwärmen direkt an dem Ventilsteuerblock und daher teilweise auch mit dessen Abwärme statt. Da der Block bereits nach kurzer Betriebszeit aufgewärmt ist, verkürzt sich die Aufwärmzeit für den Kraftstoff weiter und es kann schneller auf den weniger fließfähigen Kraftstoff umgeschaltet werden.

Nach einer weiter bevorzugten Ausführungsform weist die Kraftstoffversorgungsanlage mindestens einen Temperatursensor auf.

Wenn eine Steuerung vorhanden ist, kann diese nach einer vorab festgelegten Zeit des Warmfahrens vom Diesel- in den Rapsölbetrieb umschalten. Allerdings muss dann diese Zeit so lange bemessen sein, dass das Rapsöl auch unter ungünstigsten Bedingungen (z.B. im Winter) aufgewärmt ist. Wird dagegen die Temperatur des Kraftstoffes gemessen, kann bei günstigen Bedingungen früher und bei ungünstigen Bedingungen später umgeschaltet werden, so dass möglichst wenig Dieselkraftstoff benötigt wird. Darüber hinaus wird die Temperatur des zweiten Kraftstoffs dann ideal ermittelt, wenn sie nicht direkt im Tank, sondern erst in den Zuführleitungen, möglichst kurz vor dem Ventilsteuerblock, geprüft wird. Sobald die Prüfung ergibt, dass die Kraftstoff- (und ebenso die Motor-) Temperatur die gewünschte Temperatur erreicht hat, kann umgeschaltet werden. Dadurch reduziert man (in Verbindung mit den anderen genannten Maßnahmen wie kurzen Wegen etc. die Betriebszeit mit dem ersten Kraftstoff. Dies trägt zur schnelleren Amortisation der Anlage bei. Ist dagegen keine automatische Steuerung vorhanden, kann dem Fahrer über

den Temperatursensor signalisiert werden, dass ein Umschalten möglich ist.

Noch weiter bevorzugt kann die Kraftstoffanlage automatisch in zwei Modi, nämlich einem Modus mit geschlossenem und einem Modus mit offenem Kreislauf mit Pflanzenöl betrieben werden.

Grundsätzlich werden Benzin- und Dieselmotoren herkömmlich in einem offenen Kreislauf betrieben, das heißt, Kraftstoff wird aus dem (drucklosen) Tank von einer Pumpe unter einem geringen Druck in einen Umlauf gefördert, aus dem der benötigte Kraftstoff entnommen wird. Der nicht benötigte Kraftstoff fließt wieder in den Tank zurück und führt dabei zusätzlich etwas Wärme aus dem Motor ab. Rapsölmotoren, die auf eine gute Erwärmung des Kraftstoffes angewiesen sind, werden dagegen herkömmlich in einem geschlossenen Kreislauf betrieben. Dabei zirkuliert das Pflanzenöl in einer Leitung im Motor, und nur das verbrauchte Öl wird von der Kraftstoffpumpe in diesen Kreislauf zugeführt. Dadurch erwärmt sich das Öl im Kreislauf sicher auf die benötigte Temperatur; das Pflanzenöl im Tank wird dagegen nur durch den Wärmetauscher erwärmt . Allerdings besteht bei dem geschlossenen Kreislauf die Gefahr, dass an undichten Stellen Luft in den Kreislauf gelangt, was zu Zündaussetzern und schließlich zum Liegenbleiben des Fahrzeugs führt. Durch Spülen des Kreislaufes muss in einem solchen Fall die Luft ersetzt werden.

Erfindungsgemäß wird der Motor beim Umschalten in den Pflanzenölbetrieb ebenfalls zunächst im geschlossenen Kreislauf betrieben. Aufgrund der vorstehend beschriebenen Effekte bezüglich Wärmeleitung, Kompaktheit und Integration wird jedoch erfindungsgemäß der Kraftstoff besser als im Stand der Technik erwärmt. Zudem wird die Tem-

peratur des Kraftstoffs im Umlauf gemessen. Daher kann automatisch auf den offenen Umlauf umgeschaltet werden, wenn die Pflanzenöltemperatur ausreichend hoch, d.h. um einen Sicherheitsfaktor höher als der Wert für die Fahrt mit Öl im geschlossenen Umlauf ist. Dadurch wird das Öl im Tank erwärmt, und der (ebenfalls Leistung benötigende) Wärmetauscher kann eventuell abgestellt werden. Fällt die Öltemperatur durch diese Maßnahmen zu stark, wird (automatisch) im geschlossenen Kreislauf weitergefahren. Durch die Fahrt im offenen Kreislauf wird zuverlässig Luft aus dem System entfernt, so dass die Zuverlässigkeit höher wird.

Nach einer weiter bevorzugten Ausführungsform weist die Kraftstoffversorgungsanlage starre Kraftstoffleitungen zwischen dem Ventilsteuerblock und der Brennkraftmaschine auf, die noch weiter bevorzugt eng am Zylinderblock anliegend angeordnet sind.

Während im Stand der Technik kurze, flexible Leitungen zwischen den einzelnen Ventilen und den Zylindern sowie lange, flexible Leitungen von den Tanks zu den Zylindern verwendet werden, wird nach dieser bevorzugten Ausführungsform der Erfindung mit festen Rohren gearbeitet, die idealerweise am Motorblock oder am Zylinderkopf anliegen. Die festen, beispielsweise aus Metall gefertigten Rohre können die Wärme des Motors gut aufnehmen. Zudem sind sie eng am Motor anliegend gegen Fahrtwind und andere kühlende Einflüsse geschützt. Dadurch wird der Kraftstoff in den Rohren schnell erwärmt. Dies wurde im Stand der Technik bisher aus zwei Gründen nicht verwirklicht: Zum einen werden herkömmlich flexible Kunststoffschlauche verwendet, um bei einer Nachrüstung von Hand mehrere ähnliche Motoren umrüsten zu können, wobei die Automatisierbarkeit keine Rolle spielt, dafür aber mit ähnlichen Bauteilen unterschiedliche Abstände zwischen

Teilen des Einspritzsystems realisiert werden können, und zum zweiten ist vor allem von Ottomotoren bekannt, dass der in zu heißen Zuleitungen befindliche Kraftstoff Gasblasen bildet, die die Versorgung des Motors behindern können. Diese Gefahr besteht jedoch bei den hier bevorzugt verwendeten Kraftstoffen Rapsöl und Diesel nicht, so dass eine effektive Aufheizung des Kraftstoffs möglich ist. Die festen Rohre sind bei automatisierter Montage, beispielsweise bei einem serienmäßigen Einbau, deutlich einfacher handhabbar und praktisch wartungsfrei, da die bei Schläuchen möglichen Leckstellen weitgehend vermieden werden .

Wie vorstehend beschrieben, arbeitet die erfindungsgemäße Kraftstoffversorgungsanlage idealerweise gemeinsam mit einer Steuervorrichtung.

Nach einer bevorzugten Ausführungsform übernimmt die Steuervorrichtung der Kraftstoffanlage den kompletten Betrieb zum Umschalten von einem Kraftstoff auf den anderen. Insbesondere veranlasst die Steuervorrichtung, dass die Kraftstoffleitungen beim Abstellen des Motors nach Betrieb mit dem weniger fließfähigen Kraftstoff mit dem fließfähigen Kraftstoff gespült werden, um sicherzustellen, dass der Motor beim darauffolgenden Kaltstart problemlos starten kann.

Nach einer weiter bevorzugten Ausführungsform kann das Spülen wie im Stand der Technik durch den Fahrer ausgelöst werden, der einen Wahlschalter in der Fahrerkabine betätigt .

Wenn der Fahrer beabsichtigt, demnächst eine längere Rast einzulegen, bei der der Motor abkühlt, kann er die Spülung rechtzeitig selbst auslösen. Dann können die Zuleitungen noch während der Fahrt gespült werden, so dass

keine Nachlaufzeit des Motors zu diesem Zweck nötig ist. Dazu kann dem Fahrer ein einbauspezifischer Wert, wie lange Diesel durchgespült werden muss, mitgeteilt werden. Stellt der Fahrer das Fahrzeug ohne vorheriges (oder nach nicht ausreichendem) Spülen ab, sorgt die Steuerung dafür, dass der Motor weiterläuft, bis das System gespült ist und problemlos wieder starten kann.

Umgekehrt kann es auch zweckmäßig sein, wenn der Fahrer veranlassen kann, dass das Spülen beim Abstellen des Motors unterdrückt wird, wenn nur eine kurze Pause zu erwarten ist, beispielsweise an einem geschlossenen Bahnübergang. Daher kann der Fahrer nach einer weiter bevorzugten Ausführungsform der Kraftstoffversorgungsanlage über einen Wahlschalter das Spülen (zunächst) umgehen.

Nach einer noch weiter bevorzugten Ausführungsform überwacht dabei die Steuerung die Kraftstofftemperatur und führt das Spülen trotz der Unterdrückung selbständig durch, falls die Temperatur unter einen bestimmten Wert fällt, d.h. die Gefahr besteht, dass sich die Fließfähigkeit verschlechtert, so dass der Motor nicht mehr gestartet werden kann.

Vorteilhafte Weiterbildungen finden sich in weiteren Unteransprüchen .

Die Erfindung wird nachfolgend anhand eines Ausführungsbeispiels unter Bezugnahme auf die Zeichnung näher erläutert .

Fig. 1 zeigt einen Hydraulikschaltplan für das Ausführungsbeispiel der Erfindung.

Fig. 2 zeigt ein Ablaufdiagramm einer bevorzugten Ausführungsforms der erfindungsgemäßen Steuerung.

Die Figuren 3 bis 9 zeigen Ablaufpläne von Unterprogrammen des Hauptprogramms nach Fig. 2.

Als Ausführungsbeispiel wird, wie vorstehend erwähnt, ein Fahrzeug mit Dieselmotor verwendet, das zum Betrieb mit Rapsöl als Alternativkraftstoff umgerüstet wurde.

Beim Start des Fahrzeugs sind beide Ventile zunächst stromlos. Dadurch fließt Diesel vom Tankanschluss VD des Ventilsteuerblocks über die Anschlüsse 1 und 3 des MV V und den Anschluss VEp des Ventilsteuerblocks in Richtung des Einspritzsystems bzw. der Einspritzpumpe. Wie im Stand der Technik wird der Einspritzpumpe über diesen Vorlauf eine größere Menge an Diesel angeboten, als sie benötigt. Der überschüssige Dieselkraftstoff fließt aus dem Rücklauf des Einspritzsystems sowie die Anschlüsse 2 und 1 des MV R im sogenannten „geschlossenen Kreislauf" über den Anschluss REp des Ventilsteuerblocks.

Wenn der Motor betriebswarm ist, wird das MV V umgeschaltet (bestromt). Dadurch wird die Zufuhr von Dieselkraftstoff gestoppt und die Zufuhr von Rapsöl im „geschlossenen Kreislauf" (über die Anschlüsse 3 und 2 des MV V zu VEp, von dort zurück über REp und die Anschlüsse 2 und 1 des MV R) gestartet. Da das Rapsöl zu diesem Zeitpunkt in vorgewärmten Leitungen auf bereits warmen Dieselkraftstoff trifft, den es nach und nach ersetzt, erwärmt sich auch die vergleichsweise kleine Menge an Rapsöl bei stromlosem MV R im Vor- und Rücklauf des Einspritzsystems schnell in ausreichendem Maße. Das nicht verbrauchte Rapsöl zirkuliert weiter und kann daher das nachgeförderte Rapsöl, das das verbrannte Öl ersetzt, ebenfalls erwärmen. Damit steht während der Fahrt stets ausreichend warmes Rapsöl zur Verfügung.

Erhöht sich die Temperatur des Rapsöls im Ventilsteuerblock während der Fahrt weiter, kann das MV R umgeschaltet (bestromt) werden. Dann fließt das von dem Einspritzsystem nicht verbrauchte Rapsöl im „offenen Kreislauf" über die Anschlüsse 2 und 3 des MV R zurück in den Rapsöltank. Dadurch wird das im Tank befindliche Rapsöl schneller aufgeheizt als bei der alleinigen Heizung durch den Wärmetauscher. Zudem können Luftansammlungen, die durch Undichtigkeiten im vorstehend erörterten geschlossenen Kreislauf dazu führen können, dass Luft in den Zulauf zum Einspritzsystem gelangt, im offenen Kreislauf in den Tank zurückgegeben werden. Geschieht dies nicht, könnte es bei zu großen Luftblasen aufgrund einer Undichtigkeit im geschlossenen Kreislauf geschehen, dass das Einspritzsystem Luft statt Kraftstoff ansaugt und das Fahrzeug deshalb liegenbleibt.

Wenn erkannt wird, dass die Kraftstoffanläge gespült werden muss (weil der Fahrer den Motor abstellt oder einen entsprechenden Schalter der Steuerung betätigt, um anzuzeigen, dass der Motor demnächst abgestellt wird), wird das MV V stromlos geschaltet und Diesel fließt wie vorstehend beschrieben vom Anschluss 1 des MV V über den Anschluss 2 in den Umlauf zur Einspritzpumpe (Anschlüsse VEp und REp), um diesen zu spülen. Über die Anschlüsse 2 und 3 des noch bestromten MV R wird zudem der Rücklauf zum Rapstank (RT) mit Diesel gespült.

Das vorstehend erläuterte Grundprinzip kann je nach Auslegung des Motors modifiziert werden. Beispielsweise ist es möglich, das Rapsöl durch eine (nicht gezeigte) elektrische Hilfspumpe zirkulieren zu lassen, bevor das Fahrzeug startet, beispielsweise um es mittels einer (ebenfalls nicht gezeigten) Heizwendel aufzuwärmen. In diesem Fall wird das Rapsöl vom Anschluss VPöl durch den Ventilsteuerblock über das gezeigte Rückschlagventil zum

Anschluss RT gepumpt, ohne in den Umlauf des Einspritz - Systems zu gelangen, während der Umlauf mit Diesel ge¬ spült wird (beide MV stromlos) .

Falls eine solche Maßnahme bei einem gegebenen Motor nicht notwendig erscheint (weil z.Bsp. der zweite Kraft- stoff im Steuerblock ausreichend erwärmt wird) , kann die Leitung über das Rückschlagventil deaktiviert bleiben bzw. einfach weggelassen werden.

Im folgenden werden mögliche Steuerungsprogramme für den vorstehend erläuterten Ventilsteuerblock anhand der Figuren 2 bis 7 erörtert.

Figur 2 zeigt den allgemeinen Ablauf der Motorüberwa- chung. Sobald der Fahrschalter eingeschaltet ist (S200) , wird zunächst (S300) geprüft, ob alle Bauteile der Kraft- stoffVersorgung normal arbeiten. Falls nicht, wird dem Fahrer im Schritt S400 eine Fehlfunktion gemeldet, bei- spielsweise über ein Display, eine Warnlampe und/oder ein akustisches Signal und das Programm geht wieder an den Anfang zurück .

Falls zunächst keine Fehlfunktion festgestellt wird, wird in Schritt S500 ein (nicht gezeigtes) Programm zur Drehzahlüberwachung gestartet. Dieses Programm prüft wäh- rend einer vorab festgelegten Zeit, ob die Motordrehzahl über einen festgelegten Wert steigt, d.h. ob der Motor innerhalb dieser Zeit gestartet wird. Falls nicht, geht die Steuerung zum Schritt S400, um einen Fehler zu mel¬ den, und anschließend wieder wie vorstehend beschrieben zurück .

Anschließend wird der Motor im Schritt S600 auf her- kömmliche Weise gestartet. Wie aus der nachfolgenden Be¬ schreibung der Steuerung, insbesondere der Fig. 9, noch

klar wird, startet der Motor stets mit Dieselkraftstoff, d.h. beide Magnetventile sind ausgeschaltet.

Nach dem erfolgreichen Starten des Motors geht die Steuerung im Schritt S700 zum in Figur 3 gezeigten Unterprogramm zum Umschalten zwischen Kurzstrecken- und Automatikbetrieb. Dabei prüft das Programm, ob der Fahrer eine Taste „P/D" („Pflanzenöl/Diesel") der Steuerung gedrückt hat, um die Steuerung vom automatischen Umschalten auf Pflanzenöl abzuhalten, weil beispielsweise nur eine kurze Strecke zu fahren ist. Ist die Taste nicht gedrückt, geht das Programm zurück und fährt in der derzeitigen Betriebsart fort. Ist die Taste gedrückt, wird die Betriebsart in den Schritten S720 bis S740 in die jeweils andere Betriebsart umgeschaltet.

Ist im Schritt S710 beispielsweise die P/D-Taste gedrückt und wird im S720 festgestellt, dass die Steuerung im Automatikbetrieb ist, schaltet die Steuerung in den Kurzstreckenbetrieb. Dieses Umschalten wird anhand der Fig. 4 näher erläutert.

Im Schritt S731 der Fig. 4 werden beide Magnetventile MV_V, MV_R des Ventilsteuerblocks stromlos geschaltet. Wie vorstehend erläutert, wird der Motor daher ausschließlich mit Dieselkraftstoff versorgt. Im Schritt S732 wird geprüft, ob ein Umschalten auf Pflanzenölbetrieb möglich ist. Dazu wird (hier nicht gezeigt) der beim Automatikbetrieb erläuterte Programmschritt S742 durchgeführt. Wenn dieser Schritt ergibt, dass ein Betrieb mit Pflanzenöl möglich ist, wird im Schritt S732 jedoch nicht unmittelbar in den Pflanzenölbetrieb umgeschaltet, sondern lediglich der Fahrer beispielsweise optisch oder akustisch daran erinnert, dass ein solcher Betrieb möglich ist. Der Fahrer kann dann durch Drücken der „P/D"-Taste in den Automatikbetrieb umschalten, wie mit

Bezug auf Fig. 3 beschrieben. Im Schritt S733 geht die Steuerung zurück zum „Umschalt "-Programm.

Wird bei gedrückter P/D-Taste im Schritt S720 festgestellt, dass die Steuerung im Kurzstreckenbetrieb ist, schaltet die Steuerung in den Automatikbetrieb. Dieses Umschalten wird anhand der Fig. 5 näher erläutert.

In Fig. 5 wird im Schritt S7410 zunächst geprüft, ob die Bedingungen für Nebenantrieb oder Nurdieselbetrieb vorliegen. Diese Bedingungen liegen vor, wenn entweder ein ungünstiges Drehzahl -/Drehmomentverhältnis vorliegt („Nebenantrieb") oder beide Tanks mit Diesel gefüllt sind („Nurdieselantrieb") .

Es ist bei einem Dieselmotor zu bevorzugen, den Motor auch dann nicht im gesamten Leistungsbereich mit Pflanzenöl zu betreiben, wenn er warmgefahren ist, da sich die Verbrennungstemperaturen und damit die Verbrennungseigenschaften des Pflanzenöls ändern. Daher ist die Steuerung so angepasst, dass der Motor nur in einem für die Verbrennung von Pflanzenöl optimalen Bereich mit dem Öl betrieben wird, während er ansonsten mit Diesel betrieben wird. Beispielsweise liegt bei einem Motor zur Verbrennung von Diesel und Pflanzenöl dieser optimale Bereich der sauberen Verbrennung, besten Kompression und optimalen Haltbarkeit bei 40 bis 85 Prozent der Nennlast. Wird der Motor dagegen (im Stau oder ausschließlich zum Betrieb von Nebenaggregaten) mit minimaler Last oder (z.B. an Steigungen) mit hoher Last betrieben, ist es von Vorteil, in diesen Betriebzuständen ausschließlich mit Diesel zu fahren.

Daher prüft die Steuerung im Unterprogramm „Nebenantrieb" zunächst (Schritt *S1I1)* , ob die Drehzahl oder das Drehmoment in dem vorstehend genannten für den Pflan-

zenöleinsatz ungünstigen Bereich liegen. Dies kann durch direkten Abgriff der Daten aus dem Motormanagement erfolgen. Falls nicht, geht die Steuerung zum Schritt S7410 (Fig. 5) zurück. Liegen Drehzahl und/oder Drehmoment im genannten ungünstigen Bereich, werden im Schritt S772 beide Magnetventile ausgeschaltet. Dadurch wird der Motor mit Dieselkraftstoff versorgt. Ferner wird im Schritt S773 geprüft, ob ausreichend Pflanzenöl im Tank ist. Falls ja, wälzt die Pflanzenölpumpe das Öl um (Schritt S774), damit es warm bleibt bzw. wird, bis die ungünstigen Verbrennungsbedingungen nicht mehr vorliegen. Wenn nicht (Schritt S775), wird die Pflanzenölpumpe abgeschaltet. Anschließend kehrt das Programm zum Schritt S7410 zurück.

Ferner kann es sein, dass bei geringem Angebot an Pflanzenöl, beispielsweise bei Fahrten ins Ausland mit geringerer Dichte an Pflanzenöltankstellen oder schlicht anderen (steuerlichen) Gegebenheiten im Ausland nur mit Diesel gefahren werden soll. Für diesen Fall kann auch der (vergleichsweise große) für Pflanzenöl ausgelegte Tank mit Dieselkraftstoff befüllt werden. Diese Dieselbefüllung wird der Steuerung mitgeteilt, beispielsweise über einen Schalter am Pflanzenöltank.

Falls die beiden Tanks mit Diesel gefüllt sind, geht die Steuerung über die Schritte S7410, S7420 zum nachstehend mit Bezug auf Fig. 8 beschriebenen Nurdieselbetrieb (Schritt S780). Dieser unterscheidet sich vom „Nebenantrieb" dadurch, dass der Dieselkraftstoff aus dem für Pflanzenöl vorgesehenen Tank zugeführt wird. Daher kann auf die Vorwärmung für den Pflanzenöltank verzichtet werden. Zunächst wrd geprüft, ob der Motor abgeschaltet ist.

Ist jedoch sowohl Pflanzenöl im Tank als auch eine für den Pflanzenölbetrieb geeignete Motorlast (Dreh-

zahl/Drehmoment) vorhanden, geht die Steuerung zum Schritt S741 weiter, in dem zunächst beide Ventile MV V, MV R des Ventilsteuerblocks stromlos geschaltet sind, so dass der Motor mit Diesel läuft. Im Schritt S742 wird dann geprüft, ob die Kühlwasser temperatur KW eine Umschalttemperatur Ums, beispielsweise 60^0C (zuzüglich eines eventuellen Sicherheitszuschlags Ws, beispielsweise 5^0C) überschritten hat, mit anderen Worten, ob der Motor bereits warmgefahren ist. So lange die Kühlwassertemperatur zu niedrig ist, wird diese Abfrage wiederholt, d.h. das Programm geht zum Schritt S7410 zurück. Steigt die Kühlwassertemperatur über den genannten Wert, so wird im Schritt S743 das MV V eingeschaltet, d.h. Pflanzenöl wird in den Kreislauf der Einspritzpumpe zugeführt und verdrängt allmählich den zugeführten Dieselkraftstoff, wobei es weiter erwärmt wird. Im Schritt S744 prüft die Steuerung, ob eine vorab festgelegte Zeit VentzeitRü verstrichen ist, nach der nur Pflanzenöl im Einspritzsystem sein sollte. Wenn diese Zeit noch nicht verstrichen ist (JA im Schritt S744) geht das Programm zum Schritt S742 zurück, um zu prüfen, ob die Temperatur des Pflanzenöls ausreichend hoch bleibt. Bleibt die Temperatur hoch genug, bis VentzeitRü abgelaufen ist, („NEIN" im Schritt S744) geht das Programm zum Schritt S7450 und somit zum Unterprogramm „Reiner Pflanzenölbetrieb" weiter, das in Fig. 6 erläutert ist.

Im Schritt S7451 in Fig. 6 wird das MV R eingeschaltet, so dass nun Rapsöl im Zulauf der Einspritzpumpe zirkuliert. Im Schritt S7452 wird geprüft, ob die Temperatur an der Einspritzpumpe größer als eine Temperatur TRückauto zum automatischen Rückschalten in den Dieselbetrieb ist. Dies kann beispielsweise der Fall sein, wenn bei niedriger Last und hoher Wärmeabfuhr die Temperatur der Einspritzpumpe sinkt. Bei einem positiven Ergebnis dieser Abfrage wird in den in Fig. 7 beschriebenen Nebenantrieb

(Schritt S770) geschaltet, d.h. der Motor wird wie bei geringer Auslastung ausschließlich mit Diesel betrieben. Bleibt die Temperatur der Einspritzpumpe hoch genug, wird im Schritt S7453 geprüft, ob die P/D-Umschalttaste gedrückt ist, d.h., ob auf Wunsch des Fahrers in den Dieselbetrieb umgeschaltet werden soll . Der Fahrer kann dies beispielsweise wünschen, um ein späteres Spülen zu vermeiden. Ist die Taste gedrückt, geht das Programm zum Schritt S730 (Fig. 4); ansonsten geht es im S7454 zum Automatikbetrieb nach Fig. 5 zurück.

In Fig. 5 prüft das Programm dann im Schritt S746, ob der Motor auf Wunsch des Fahrers auszuschalten ist. Wenn nicht, geht das Programm zum Schritt S7450 zurück und wiederholt den Ablauf für den reinen Pflanzenölbetrieb.

Soll der Motor ausgeschaltet werden, geht das Programm im Schritt S7460 der Fig. 5 zum in Fig. 9 gezeigten Unterprogramm. In diesem Programm wird zunächst im Schritt S7461 geprüft, ob der Motor bereits ausreichend lange (ca. 1 min) im Dieselbetrieb arbeitet. Wenn ja, wird der Motor abgestellt (Schritt S7466) und das Programm beendet .

Wenn der Motor noch nicht lange genug mit Diesel betrieben wird, werden zunächst (Schritte S7462, S7463) die Pflanzenöl -Umlaufpumpe und die Magnetventile abgeschaltet, so dass dem Einspritzsystem nur noch Dieselkraftstoff zugeführt wird. Anschließend wird das Einspritzsystem für ca. eine Minute mit Dieselkraftstoff gespült (Schritt S7464) , so dass kein Pflanzenöl im Einspritzsystem mehr vorhanden ist, und anschließend der Motor abgestellt (Schritt S7464) . Danach (Schritt S7467) wird geprüft, ob die „Kurzstop" -Taste gedrückt wurde, d.h. der Fahrer beabsichtigt, in Kürze mit warmem Motor weiterzufahren. Falls ja, startet der Motor im Automatikbetrieb

neu, d.h. , wenn die Voraussetzungen (Wärme, Belastung etc.) erfüllt sind, wird wieder in den reinen Pflanzenölbetrieb geschaltet. Wenn dagegen die „Kurzstop"-Taste nicht gedrückt wurde, wird das Programm beendet, d.h. der Motor startet beim nächsten Anfahren in dem herkömmlichen Steuermodus .

Weiterhin kann die Steuerung so ausgelegt sein, dass sie die Kraftstoffversorgung auf den vom Hersteller vorgesehenen Kraftstoff, beispielsweise Diesel, umschaltet, wenn die Motorlast für eine vorab bestimmte Zeit unterhalb einer vorab bestimmten Last bleibt (und/oder umgekehrt auch so, dass umgeschaltet wird, wenn die Motorlast für eine vorab bestimmte Zeit eine maximale Last überschreitet) . Statt der Motorlast, die man aus Daten eines Motormanagements erhalten kann, ist es bei einer einfacheren Ausführungsform auch möglich, ausgehend von der Motordrehzahl umzuschalten. Ein Diesel fährt am besten mit einer konstanten Last von 40-85 %, dabei hält er mit Abstand am längsten, weist die besten Verbrennungswerte, eine saubere Kompression usw. auf. Bei einer geringen Motordrehzahl, wenn beispielsweise nur Nebenaggregate des Fahrzeugs wie Klimaanlagen, Silopumpen, Betonmischer, hydraulische Anlagen usw. betrieben werden, können sich verstärkt Ablagerungen durch unvollständige Verbrennung bilden. Dies kann vermieden oder zumindest stark reduziert werden, wenn unter solchen Umständen auf den vom Hersteller vorgesehenen Kraftstoff umgeschaltet wird. Fig. 7 zeigt ein Beispiel eines Unterprogramms zu diesem Zweck. Zunächst wird von der Steuerung entweder über zusätzliche Sensoren oder über direkten Zugriff auf Motormanagementdaten festgestellt, ob die Motorlast in einem ungünstigen Bereich liegt, d.h. Drehzahl und/oder Drehmoment außerhalb des o.g. Bereichs liegen (Schritt S771) . Falls ja, werden beide Magnetventile abgeschaltet (Schritt S772) . Anschließend wird geprüft, ob mindestens

eine bestimmte Menge, beispielsweise rund 10 Prozent einer Tankfüllung an Pflanzenöl im Tank ist (Schritt S773). Falls ja, wird das Öl umgewälzt, um es mit der Abwärme des Motors aufzuwärmen (Schritt *S1lA)*. Ist die Ölmenge jedoch gering, wird die Pumpe abgeschaltet, um nicht eventuelle Verunreinigungen am Boden des Tanks aufzuwirbeln und zu fördern (Schritt S775). Anschließend kehrt das Programm zum Hauptprogramm zurück.

Natürlich ist der vorstehend beschriebene Aufbau nicht auf das Umschalten von Raps- oder anderem Pflanzenöl auf Diesel beschränkt, sondern kann bei entsprechender Anpassung für alle denkbaren Kraftstoffpaarungen eines Zweistoffmotors verwendet werden. Beispiele für weitere Kraftstoffpaarungen sind Benzin / Ethanol, Benzin / Flüssiggas, Benzin / Flüssigwasserstoff oder Flüssigwasserstoff / Flüssiggas. Obwohl bei diesen Paarungen die Probleme unterschiedlich von den hier beschriebenen sind (so muss beispielsweise wahrscheinlich nicht bei jeder dieser Paarungen gespült werden), kann das gezeigte Konzept eines Ventilsteuerblocks, in den alle zum Umschalten nötigen Ventile integriert sind und der von einer Steuereinheit angesteuert wird, vorteilhaft für verschiedene Kraftstoffpaarungen verwendet werden.

Ansprüche

1. Kraftstoffversorgungsanlage zur Versorgung einer Brennkraftmaschine über verschiedene Kraftstoffleitungen mit wahlweise einem Kraftstoff A oder einem Kraftstoff B, mit einer steuerbaren Ventilanordnung zur Umschaltung zwischen den Kraftstoffen,
gekennzeichnet durch
einen Ventilsteuerblock, in den die Ventilanordnung integriert ist.

2. Kraftstoffversorgungsanlage nach Anspruch 1, dadurch gekennzeichnet, dass der Ventilsteuerblock aus einem wärmeleitenden Material hergestellt ist.

3. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass der Ventilsteuerblock benachbart zu einem Wärmetauscher zum Aufheizen eines der Kraftstoffe angeordnet ist.

4. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, gekennzeichnet durch eine Steuereinrichtung, welche die Kraftstoffversorgung durch Ansteuern des Ventilsteuerblocks steuert.

5. Kraftstoffversorgungsanlage nach Anspruch 4, dadurch gekennzeichnet, dass die Steuervorrichtung zumindest eine Ein-/Ausgabeeinheit aufweist, die in der Fahrgastzelle angeordnet ist.

6. Kraftstoff Versorgungsanlage nach Anspruch 4 oder 5, dadurch gekennzeichnet, dass die Steuervorrichtung veranlasst, dass mindestens eine der Kraftstoffzuleitungen vor einem endgültigen Abstellen der Brennkraftmaschine mit dem anderen Kraftstoff gespült werden.

7. Kraftstoff Versorgungsanlage nach Anspruch 6, dadurch gekennzeichnet, dass eine Spülung auch durch Drücken eines Wahlschalters in der Fahrerkabine auslösbar ist.

8. Kraftstoff Versorgungsanlage nach Anspruch 6 oder 7, dadurch gekennzeichnet, dass das Spülen durch Drücken eines Wahlschalters in der Fahrerkabine unterdrückbar ist.

9. Kraft Stoff Versorgungsanlage nach Anspruch 8, dadurch gekennzeichnet, dass die Unterdrückung des Spülen automatisch aufgehoben und das Spülen durchgeführt wird, wenn ein Sensor meldet, dass die Temperatur eines der Kraftstoffe unter einen vorab festgelegten Wert gefallen ist.

10. Brennkraftmaschine mit einer Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, gekennzeichnet durch mindestens einen Temperatursensor zum Feststellen der Temperatur mindestens eines Mediums, das eine Aussage über den Betriebszustand der Brennkraftmaschine zulässt.

11. Brennkraftmaschine mit einer Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, gekennzeichnet durch starre Kraftstoffleitungen zwischen dem Ventilsteuerblock und der Brennkraftmaschine.

12. Brennkraftmaschine mit einer Kraftstoffversorgungsanlage nach Anspruch 11, dadurch gekennzeichnet, dass die Kraftstoffleitungen zumindest für einen der Kraftstoffe eng an einem Motorblock und/oder Zylinderkopf der Brennkraftmaschine entlang geführt werden

13. Steuervorrichtung für eine Kraftstoffversorgungsanlage nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die Steuervorrichtung die Kraftstoffversorgungsanlage abhängig von der Last des Motors steuert.

14. Steuervorrichtung nach Anspruch 13, dadurch gekennzeichnet, dass die Steuervorrichtung die Last des Motors abschätzt und veranlasst, dass die Kraftstoff Versorgung umschaltet, wenn die Last des Motors für eine vorab bestimmte Zeit unterhalb einer vorab bestimmten Last liegt.

15. Steuervorrichtung nach Anspruch 13, dadurch gekennzeichnet, dass sie die Last des Motors aufgrund von Motormanagementdaten ermittelt und die Kraftstoffversorgungsanläge aufgrund der ermittelten Werte umschaltet.

16. Steuervorrichtung nach einem der Ansprüche 13 bis 15, dadurch gekennzeichnet, dass sie die Kraftstoffversorgungsanlage umschaltet, wenn nur Nebenaggregate laufen.

17. Steuervorrichtung nach einem der Ansprüche 13 bis 16, dadurch gekennzeichnet, dass sie durch Öffnen eines in der Ventilanordnung angeordneten Rücklaufventils (MV R) veranlasst, dass im Betrieb mit Kraftstoff B von der Einspritzpumpe nicht verbrauchter Kraftstoff in den entsprechenden Tank zurückgeführt wird.

18. Steuervorrichtung nach einem der Ansprüche 13 bis 17, dadurch gekennzeichnet, dass sie einem Bediener eine Möglichkeit bietet, manuell auf Kraftstoff A umzuschalten bzw. die Umschaltung auf Kraftstoff B manuell zu verhindern.

19. Steuervorrichtung nach Anspruch 18, gekennzeichnet durch eine Vorrichtung, um den Bediener daran zu erinnern, dass mit Kraftstoff B gefahren werden könnte, wenn die dafür erforderlichen Bedingungen vorliegen, der Bediener die Umschaltung auf Kraftstoff B jedoch manuell verhindert hat.

20. Steuervorrichtung nach einem der Ansprüche 13 bis 19, dadurch gekennzeichnet, dass sie zunächst ein in der Ventilanordnung angeordnetes Vorlaufventil (MV V) einschaltet, sobald ein Merkmal des Kraftstoffs B einen ersten vorab

festgelegten Wert aufweist oder überschreitet, und später das in der Ventilanordnung angeordnete Rücklaufventil (MV R) des Ventilsteuerblocks einschaltet, sobald das Merkmal des Kraftstoffs B einen zweiten vorab festgelegten Wert aufweist oder überschreitet .

21. Steuervorrichtung nach Anspruch 20, dadurch gekennzeichnet, dass sie das Umschalten des Rücklaufventils rückgängig macht, sobald das Merkmal des Kraftstoffs B den ersten vorab festgelegten Wert wieder unterschreitet.

GEÄNDERTE ANSPRÜCHE
beim Internationalen Büro eingegangen am 10 April 2007 (10.04.2007)

1. Kraftstoffversorgungsanlage zur Versorgung einer Brennkraftmaschine über verschiedene Kraftstoffl θitungen mit wahlweise einem Kraftstoff aus einem ersten Tank oder einem Kraftstoff aus einem zweiten Tank,

mit einer steuerbaren Ventilanordnung zur Umschaltung zwischen den Kraftstoffen aus dem ersten Tank und aus dem zweiten Tank,

einem Ventilsteuerblock, in den die Ventilanordnung integriert ist, und in den Kraftstoffzuleitungen von den Tanks münden und der die Kraftstoffe über weitere Leitungen an die Einspritzanlage verteilt, und

einer Steuervorrichtung zur Steuerung der Kraftstoffversorgungsanlage durch Steuern der Ventilanordnung abhängig von der Belastung des Motors, dadurch gekennzeichnet, dass

die Steuervorrichtung so aufgebaut ist, dass sie zunächst ein in der Ventilanopdnung angeordnetes Vorlaufventil (MV V) einschaltet, sobald ein Merkmal des Kraftstoffs aus dem zweiten Tank einen ersten vorab festgelegten Wert aufweist oder überschreitet, und später das in der Ventilanordnung angeordnete Rücklaufventil (MV R) des Vβntilsteuerblocks einschaltet, sobald das Merkmal des Kraftstoffs aus dem zweiten Tank einen zweiten vorab festgelegten Wert aufweist oder überschreitet.

2. Kraftstoffversorgungsanlage nach Anspruch 1, dadurch gekennzeichnet, dass sie das in der Ventilanordnung angeordnete Vorlaufventil (MV V) wieder ausschaltet, sobald ein Merkmal des Kraftstoffs aus dem zweiten Tank den ersten vorab festgelegten Wert wieder unterschreitet.

3. Kraftstoffversorgungsanlage nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Steuervorrichtung so aufgebaut ist, dass sie das Umschalten des Rücklaufventils (MV R) rückgängig macht, sobald das Merkmal des Kraftstoffs aus dem zweiten Tank den zweiten vorab festgelegten Wert wieder unterschreitet

4. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass der Ventilsteuerblock benachbart zu einem Wärmetauscher zum Aufheizen eines der Kraftstoffe angeordnet ist.

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5. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, gekennzeichnet durch eine Steuereinrichtung, welche die Kraftstoffversorgung und den Ventilsteuerblock automatisch steuert.

6. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Steuervorrichtung zumindest eine Ein-/Ausgabeeinheit mit einem Display aufweist, die in der Fahrgastzelle angeordnet ist.

7. Kraftstoffversorgungsanlage nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Steuervorrichtung veranlasse dass mindestens das Motor-Einspritzsystem vor einem endgültigen Abstellen der Brennkraftmaschine mit dem anderen Kraftstoff gespült wird.

8. Kraftstoffversorgungsanlage nach Anspruch 7, dadurch gekennzeichnet, dass eine Spülung auch durch Drücken eines Wahlschalters in der Fahrerkabine auslösbar ist.

9. Kraftstoffversorgungsanlage nach Anspruch 7 oder 8, dadurch gekennzeichnet, dass das Spülen durch Drücken eines Wahlschalters in der Fahrerkabine unterdrückbar ist.

10. Kraftstoffversorgungsanlage nach Anspruch 9, dadurch gekennzeichnet, dass die Unterdrückung des Spülen automatisch aufgehoben und das Spülen durchgeführt wird, wenn ein Sensor meldet, dass die Temperatur eines der Kraftstoffe unter einen vorab festgelegten Wert gefallen ist.

11. Brennkraftmaschine mit einer Kraftstoffversorgungsa πlage nach einem der vorhergehenden Ansprüche, gekennzeichnet durch mindestens einen Temperatursensor zum Feststellen der Temperatur mindestens eines Mediums, das eine Aussage über den Betriebszustand der Brennkraftmaschine zulässt

12. Steuervorrichtung zur Steuerung der Kraftstoffversorgungsanlage nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, dass die Steuervorrichtung die Last des Motors abschätzt und veranlasst, dass die Kraftstoffversorgung umschaltet, wenn die Last des Motors für eine vorab bestimmte Zeit unterhalb einer vorab bestimmten Last liegt.

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13. Steuervorrichtung nach Anspruch 12, dadurch gekennzeichnet, dass sie die Last des Motors aufgrund von Motorrnanagementdaten ermittelt und die Kraftstoffversorgungsanlage aufgrund der ermittelten Werte umschaltet.

14. Steuervorrichtung nach einem der Ansprüche 12 oder 13, dadurch gekennzeichnet, dass sie die Kraftstoffversorgungsa πlage umschalten kann, wenn nur Nebenaggregate laufen.

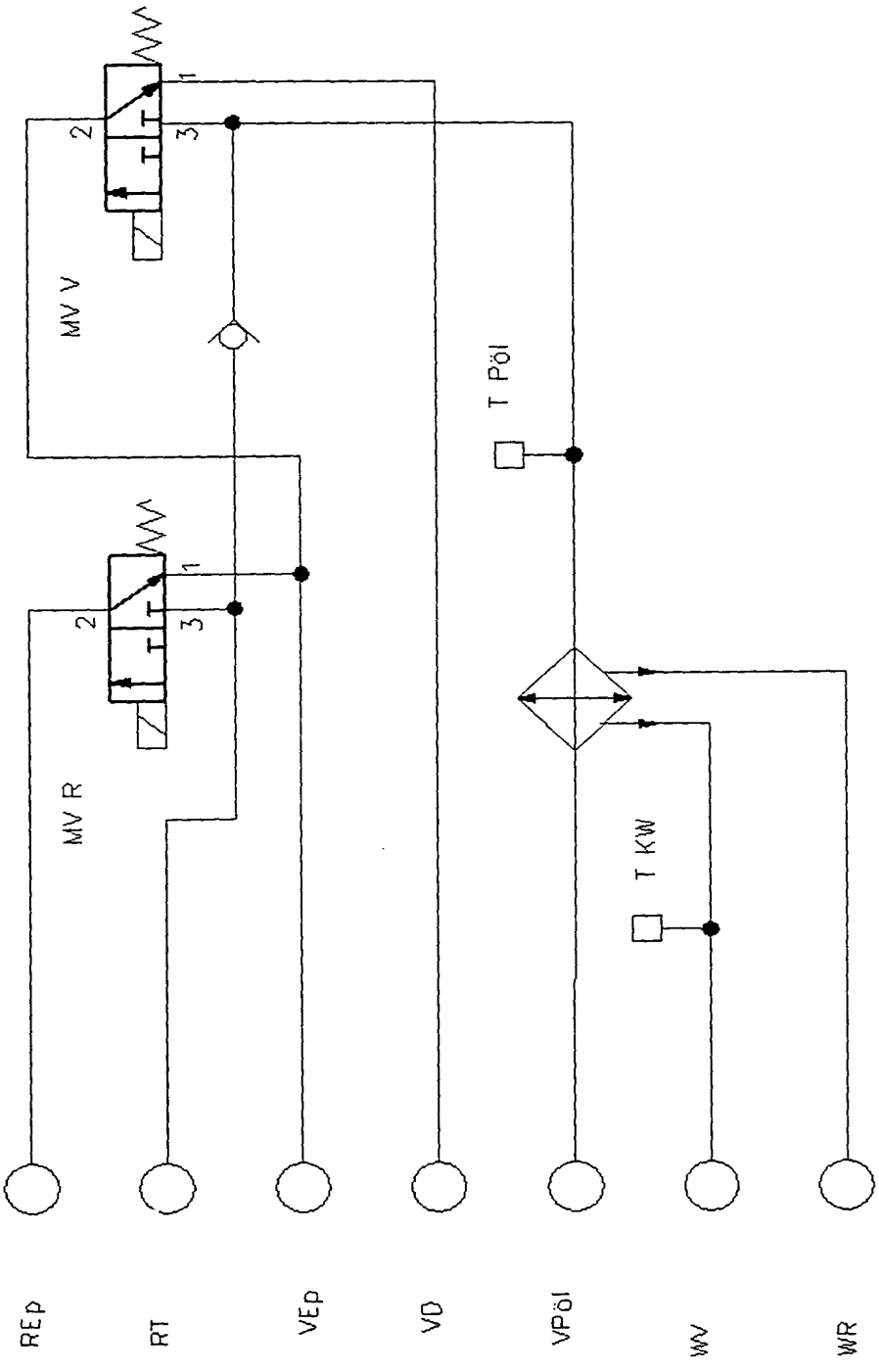
15. Steuervorrichtung nach einem der Ansprüche 12 bis 14, dadurch gekennzeichnet, dass sie durch Öffnen eines in der Ventilanordnung angeordneten Rücklaufventils (MV R) veranlasst, dass im Betrieb mit Kraftstoff aus dem zweiten Tank von der Einspritzpumpe nicht verbrauchter Kraftstoff in den entsprechenden Tank zurückgeführt wird.

16. Steuervorrichtung nach einem der Ansprüche 12 bis 15, dadurch gekennzeichnet, dass sie einem Bediener eine Möglichkeit bietet, manuell auf Kraftstoff aus dem ersten Tank umzuschalten bzw. die Umschaltung auf Kraftstoff aus dem zweiten Tank manuell zu verhindern.

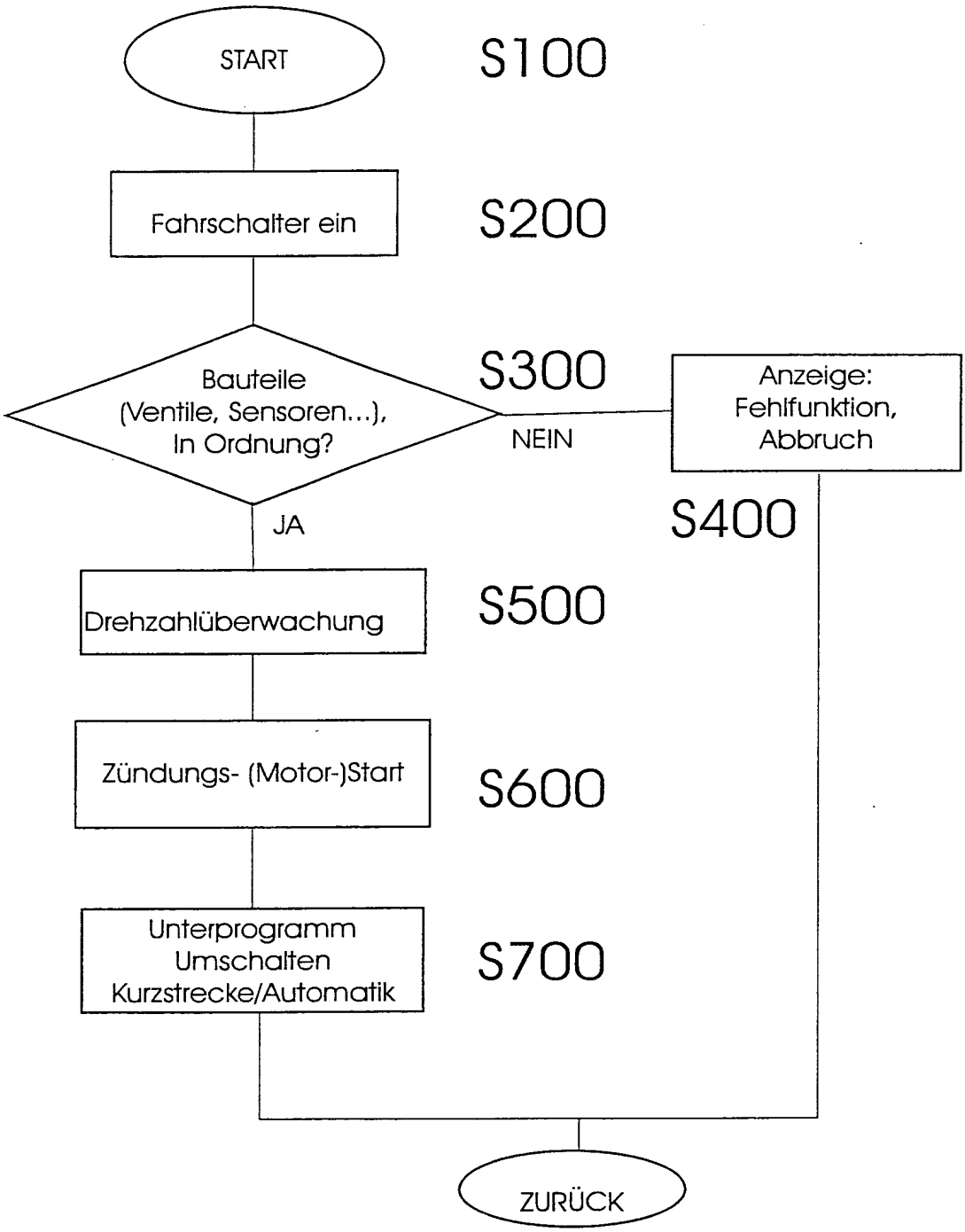
17. Steuervorrichtung nach Anspruch 16, gekennzeichnet durch eine Vorrichtung, um den Bediener daran zu erinnern, dass mit Kraftstoff aus dem zweiten Tank gefahren werden könnte, wenn die dafür erforderlichen Bedingungen vorliegen, der Bediener die Umschaltung auf Kraftstoff aus dem zweiten Tank jedoch manuell verhindert hat.

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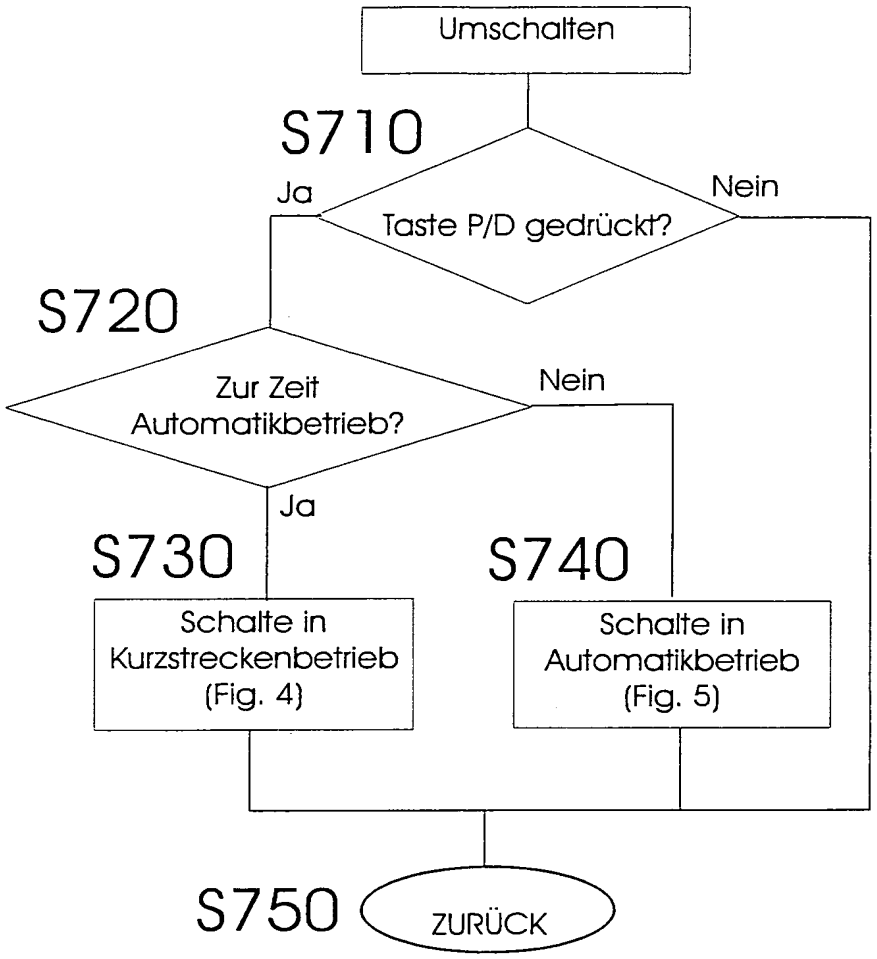
Figur 1



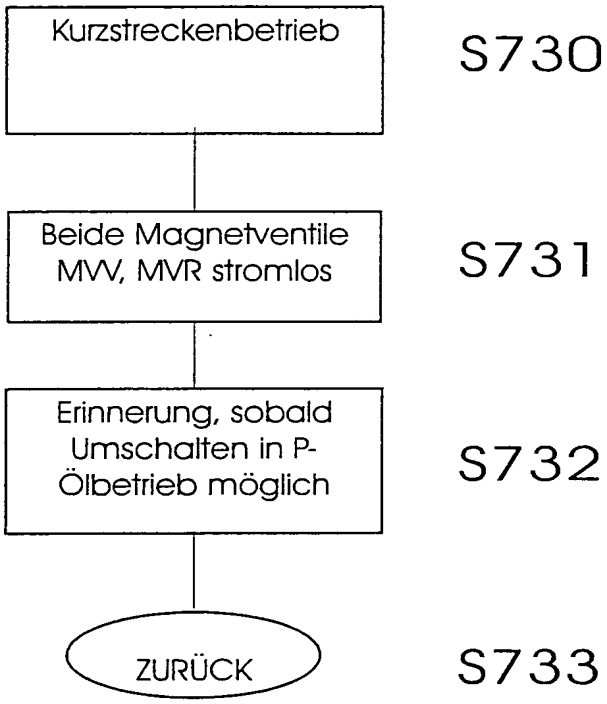
FIGUR 2


START
S100
Fahrschalter ein
S200
Bauteile (Ventile, Sensoren...), In Ordnung?
S300
NEIN
Anzeige: Fehlfunktion, Abbruch
S400
JA
Drehzahlüberwachung
S500
Zündungs- (Motor-)Start
S600
Unterprogramm Umschalten Kurzstrecke/Automatik
S700
ZURÜCK

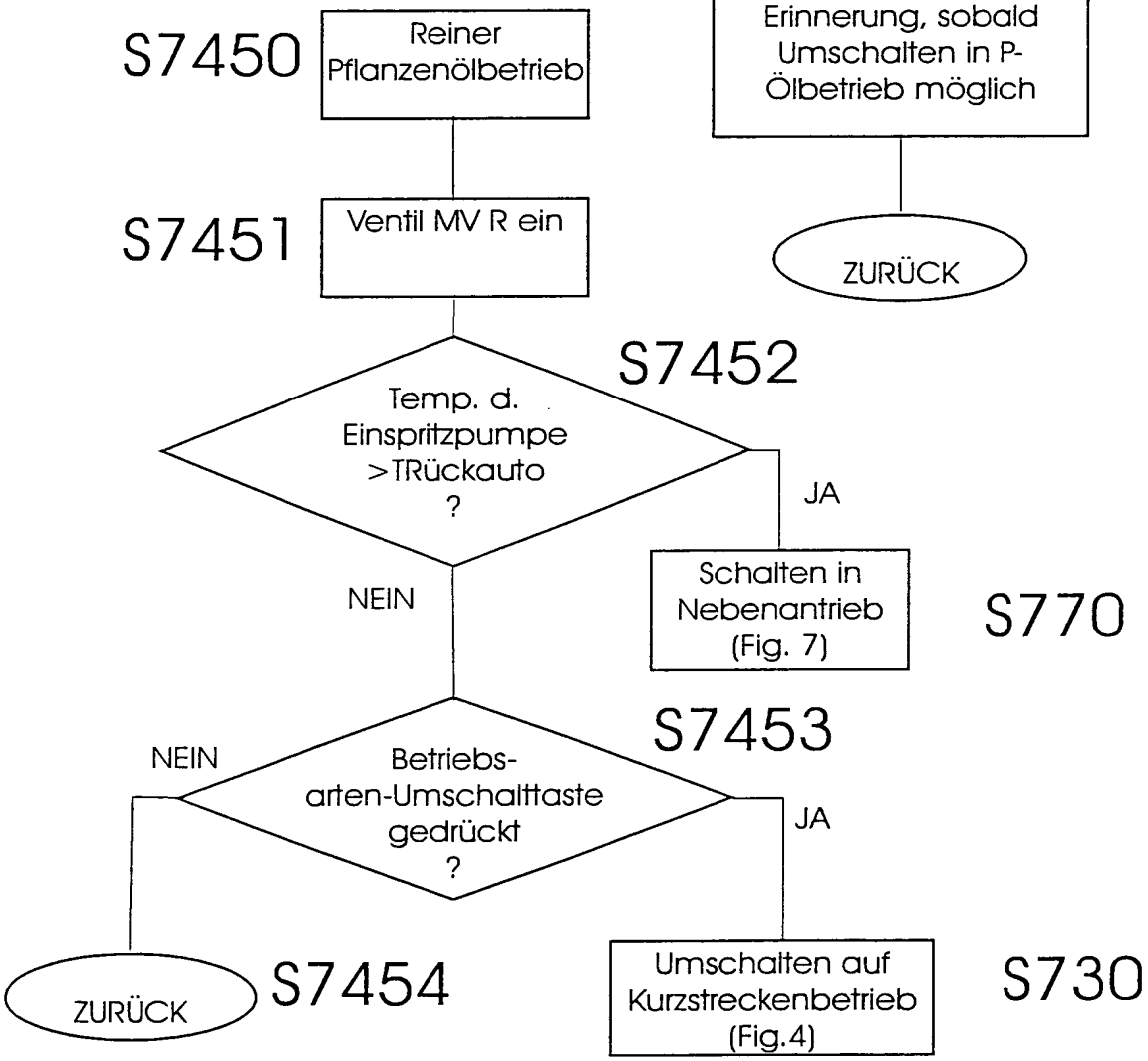
FIGUR 3


Umschalten
S710
Ja
Nein
Taste P/D gedrückt?
S720
Zur Zeit Automatikbetrieb?
Nein
Ja
S730
S740
Schalte in Kurzstreckenbetrieb (Fig. 4)
Schalte in Automatikbetrieb (Fig. 5)
S750
ZURÜCK

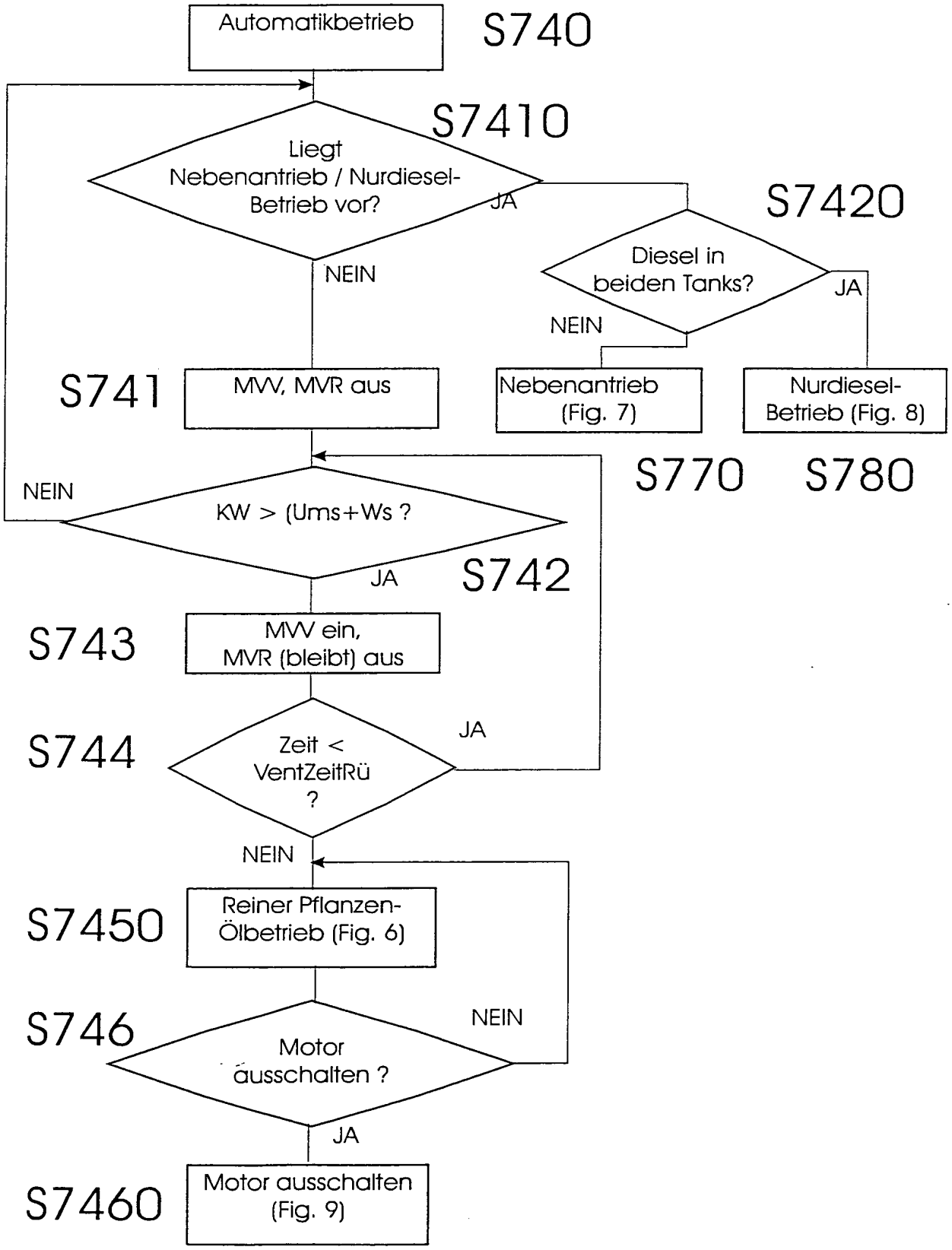
Figur 4



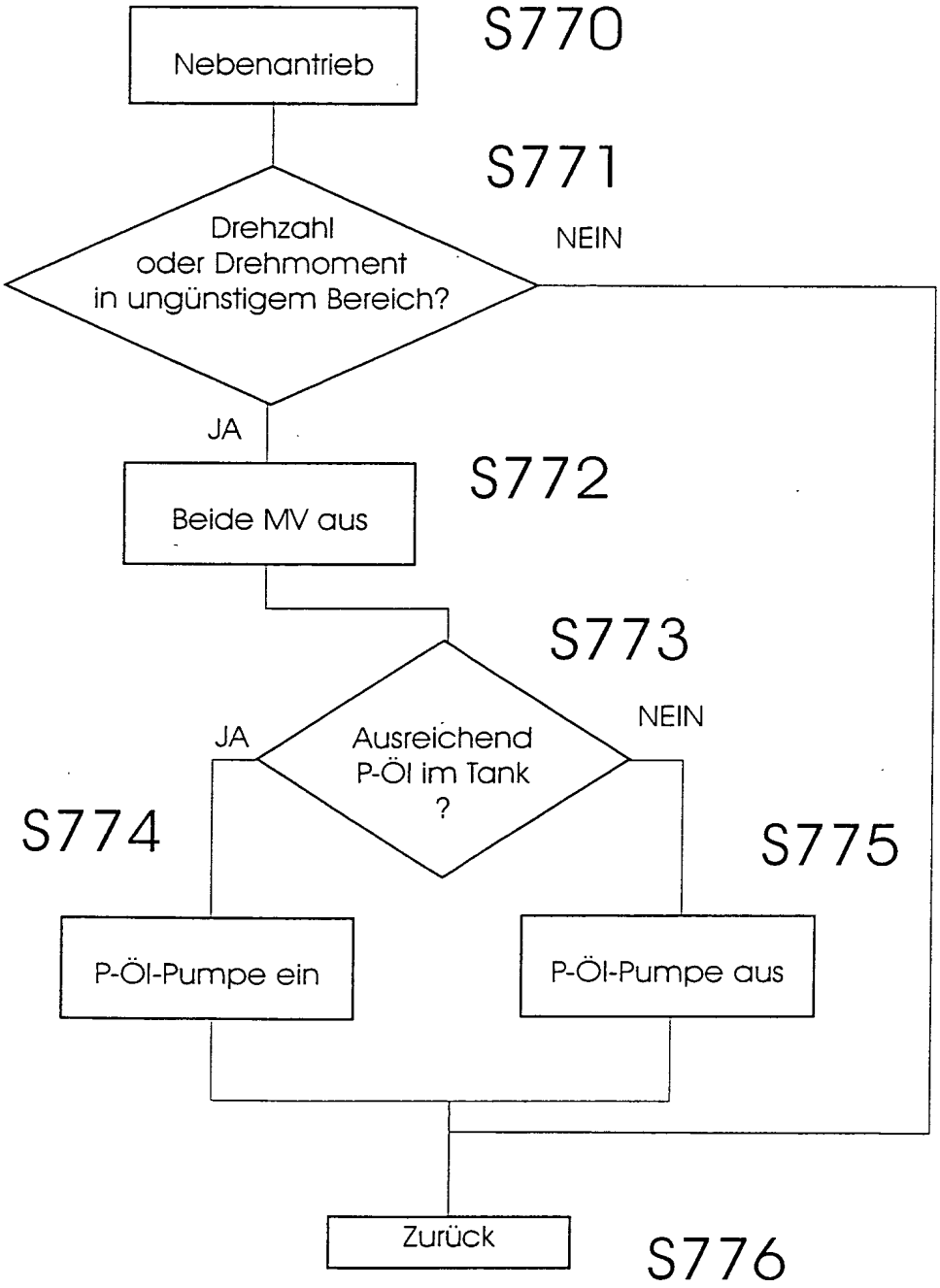
Figur 6



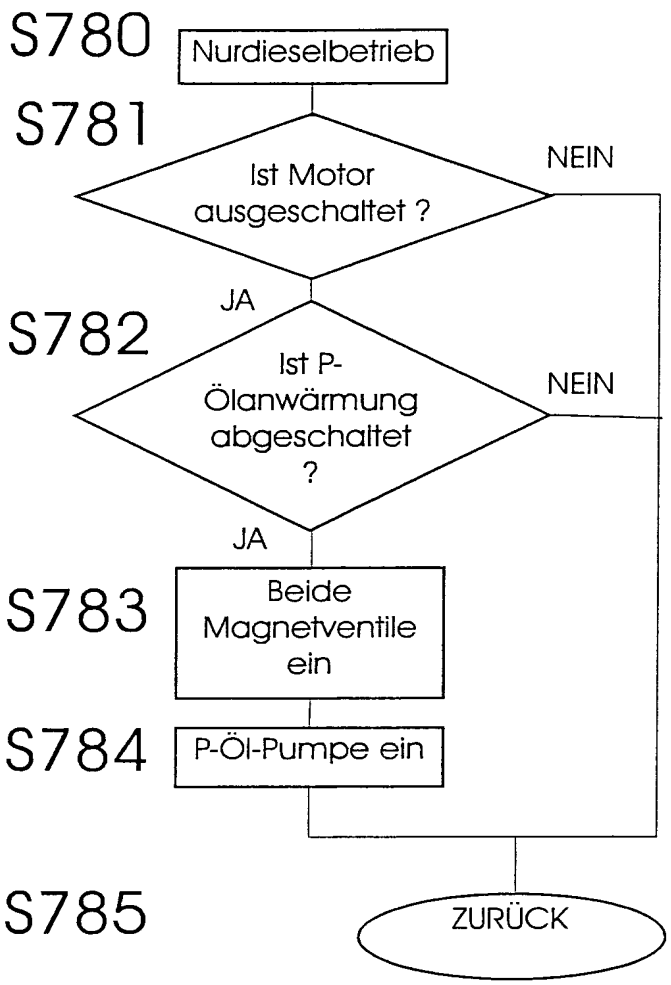
Figur 5


Automatikbetrieb
S740
S7410
Liegt Nebenantrieb / Nurdiesel-Betrieb vor?
JA
NEIN
S7420
Diesel in beiden Tanks?
JA
NEIN
S741
MVV, MVR aus
Nebenantrieb (Fig. 7)
Nurdiesel-Betrieb (Fig. 8)
S770
S780
NEIN
KW > (Ums+Ws ?
JA
S742
S743
MVV ein, MVR (bleibt) aus
S744
Zeit < VentZeitRü ?
JA
NEIN
S7450
Reiner Pflanzen-Ölbetrieb (Fig. 6)
S746
Motor ausschalten ?
NEIN
JA
S7460
Motor ausschalten (Fig. 9)

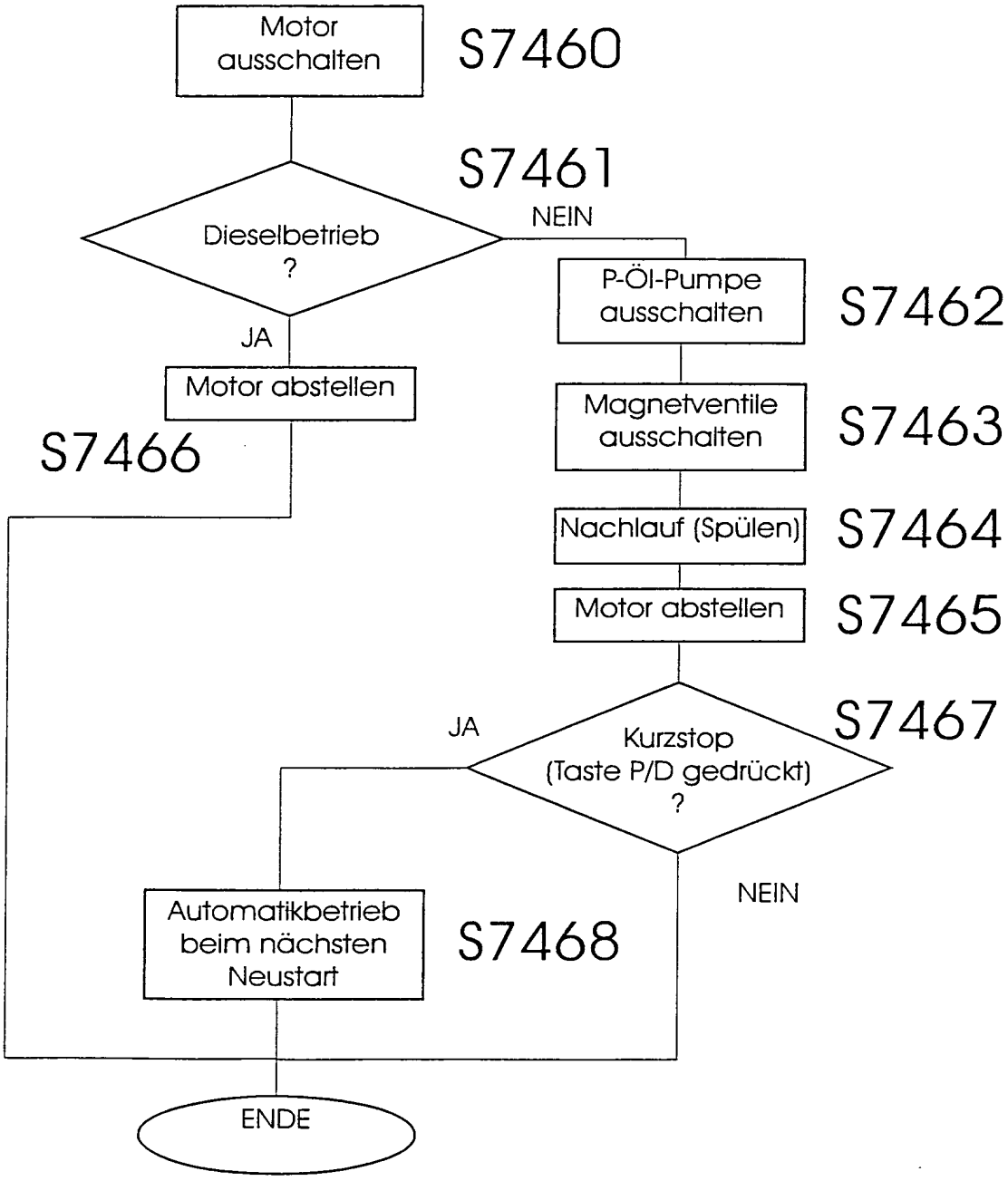
Figur 7


Nebenantrieb
S770
S771
Drehzahl
oder Drehmoment
in ungünstigem Bereich?
NEIN
JA
Beide MV aus
S772
S773
Ausreichend
P-Öl im Tank
?
JA
NEIN
S774
S775
P-Öl-Pumpe ein
P-Öl-Pumpe aus
Zurück
S776

Figur 8


S780
Nurdieselbetrieb
S781
Ist Motor ausgeschaltet ?
NEIN
JA
S782
Ist P-Ölanwärmung abgeschaltet ?
NEIN
JA
S783
Beide Magnetventile ein
S784
P-Öl-Pumpe ein
S785
ZURÜCK

Figur 9


Motor ausschalten
S7460
S7461
Dieselbetrieb ?
NEIN
JA
P-ÖI-Pumpe ausschalten
S7462
Motor abstellen
S7466
Magnetventile ausschalten
S7463
Nachlauf (Spülen)
S7464
Motor abstellen
S7465
S7467
JA
Kurzstop (Taste P/D gedrückt) ?
NEIN
Automatikbetrieb beim nächsten Neustart
S7468
ENDE

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/010380

A. CLASSIFICATION OF SUBJECT MATTER
INV. F02D19/06
ADD. F02M37/00 F02M31/16 F02M55/02

According to International Patent Classification (IPC) orto both national Classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (Classification System followed by Classification Symbols)
F02D F02M

Documontation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X Y	US 2 984 229 A (VAUGHAN PAUL S) 16 May 1961 (1961-05-16) figures col umn 1, line 15 - line 47	1,2,4-6, 10,13,18 8,9,11, 12
A	col umn 1, line 66 - col umn 4, line 29	3,7, 14-17, 19-21
Y	DE 100 60 573 A1 (FINGER RALPH) 6 September 2001 (2001-09-06) abstract; figures col umn 2, line 16 - line 47 col umn 2, line 63 - col umn 3, line 3	8,9
A	col umn 3, line 37 - col umn 4, line 25	1-7, 10-21

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 February 2007	14/02/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswi)k Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Döring, Marcus

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/010380

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	DE 12 03 046 B (WILLY SOSSIAUX) 14 October 1965 (1965-10-14) figures col umn 1, line 1 - line 51 col umn 3, line 20 - line 35	11,12
A	col umn 4, line 43 - line 63	1-10, 13-21
X	DE 196 35 220 Al (LOHMANN GEORG) 14 May 1998 (1998-05-14) abstract ; figures	1,4-6, 10, 13
A	col umn 1, line 3 - col umn 3, line 64	2,3,7-9 , 11,12, 14-21
X	DE 39 29 115 Al (ELSBETT LUDWIG ET AL.) 7 March 1991 (1991-03-07) abstract ; figure col umn 1, line 3 - col umn 2, line 7	1,4-7, 10, 13-15
A	col umn 2, line 55 - col umn 3, line 8	2,3,8,9 , 11,12, 16-21
X	EP 1 462 636 A2 (AFHYMAT) 29 September 2004 (2004-09-29)	1,4-6, 10, 13, 16, 17
Y	abstract ; figures	2,3
A	col umn 3, line 12 - col umn 6, line 44	7-9, 11, 12, 14, 15, 18-21
Y	DE 44 33 500 Al (LOHMANN GEORG) 28 March 1996 (1996-03-28) abstract ; figure	2,3
A	col umn 1, line 19 - line 32	1,4-21
P,X	EP 1 647 699 A (KANGLER WOLFRAM) 19 Apri l 2006 (2006-04-19) abstract ; figures col umn 1, paragraph 1 - col umn 2, Paragraph 7 col umn 3, paragraph 14 - col umn 5, paragraph 24 col umn 6, paragraph 29 - col umn 10, paragraph 51	1,2,4, 10
A	DE 44 18 856 Al (ROBUR WERKE GMBH I. L.) 7 December 1995 (1995-12-07) abstract ; figures col umn 2, line 13 - line 54	1-21

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/010380

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	DE 101 54 455 A1 (GENTSCH DIETMAR) 15 May 2003 (2003-05-15) cited in the application abstract ; figures column 1, paragraph 4 - column 3, Paragraph 14	1-21
A	DE 38 00 585 Al (KLÖCKNER-HUMBOLDT-DEUTZ AG) 28 July 1988 (1988-07-28) cited in the application abstract; figures column 2, line 2 - line 23 column 2, line 66 - column 4, line 53	1-21

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

Information on patent family members

International application No
PCT/EP2006/010380

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2984229 A	16-05-1961	NONE	
DE 10060573 A1	06-09-2001	NONE	
DE 1203046 B	14-10-1965	NONE	
DE 19635220 A1	14-05-1998	NONE	
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DE 10154455 A1	15-05-2003	NONE	
DE 3800585 A1	28-07-1988	NONE	

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen
PCT/EP2006/010380

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
INV. F02D19/06
ADD. F02M37/00 F02M31/16 F02M55/02

Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
F02D F02M

Recherchierte, aber nicht zum Mindestprüf Stoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)
EPO-Internal , WPI Data

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
X Y	US 2 984 229 A (VAUGHAN PAUL S) 16. Mai 1961 (1961-05-16) Abbildungen Spalte 1, Zeile 15 - Zeile 47	1,2,4-6, 10,13,18 8,9,11, 12
A	Spalte 1, Zeile 66 - Spalte 4, Zeile 29	3,7, 14-17, 19-21

Y	DE 100 60 573 A1 (FINGER RALPH) 6. September 2001 (2001-09-06) Zusammenfassung; Abbildungen Spalte 2, Zeile 16 - Zeile 47 Spalte 2, Zeile 63 - Spalte 3, Zeile 3	8,9
A	Spalte 3, Zeile 37 - Spalte 4, Zeile 25	1-7, 10-21

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[X] Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen [X] Siehe Anhang Patentfamilie

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'&' Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
7. Februar 2007	14/02/2007

Name und Postanschrift der Internationalen Recherchenbehörde	Bevollmächtigter Bediensteter
Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL - 2280 HV RijSWiJk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Döring, Marcus

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INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen
PCT/EP2006/010380

C. (Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
Y	DE 12 03 046 B (WILLY GOSSIAUX) 14. Oktober 1965 (1965-10-14) Abbildungen Spalte 1, Zeile 1 - Zeile 51 Spalte 3, Zeile 20 - Zeile 35	11, 12
A	Spalte 4, Zeile 43 - Zeile 63	1-10, 13-21
X	DE 196 35 220 A1 (LOHMANN GEORG) 14. Mai 1998 (1998-05-14) Zusammenfassung; Abbildungen	1,4-6, 10, 13
A	Spalte 1, Zeile 3 - Spalte 3, Zeile 64	2,3,7-9, 11,12, 14-21
X	DE 39 29 115 A1 (ELSBETT LUDWIG ET AL.) 7. März 1991 (1991-03-07) Zusammenfassung; Abbildung Spalte 1, Zeile 3 - Spalte 2, Zeile 7	1,4-7, 10, 13-15
A	Spalte 2, Zeile 55 - Spalte 3, Zeile 8	2,3,8,9, 11,12, 16-21
X	EP 1 462 636 A2 (AFHYMAT) 29. September 2004 (2004-09-29)	1,4-6, 10, 13, 16, 17
Y	Zusammenfassung; Abbildungen	2,3
A	Spalte 3, Zeile 12 - Spalte 6, Zeile 44	7-9, 11, 12, 14, 15, 18-21
Y	DE 44 33 500 A1 (LOHMANN GEORG) 28. März 1996 (1996-03-28) Zusammenfassung; Abbildung	2,3
A	Spalte 1, Zeile 19 - Zeile 32	1,4-21
P,X	EP 1 647 699 A (KANGLER WOLFRAM) 19. April 2006 (2006-04-19) Zusammenfassung; Abbildungen Spalte 1, Absatz 1 - Spalte 2, Absatz 7 Spalte 3, Absatz 14 - Spalte 5, Absatz 24 Spalte 6, Absatz 29 - Spalte 10, Absatz 51	1,2,4, 10
A	DE 44 18 856 A1 (ROBUR WERKE GMBH I. L.) 7. Dezember 1995 (1995-12-07) Zusammenfassung; Abbildungen Spalte 2, Zeile 13 - Zeile 54	1-21
A	DE 101 54 455 A1 (GENTSCH DIETMAR) 15. Mai 2003 (2003-05-15) in der Anmeldung erwähnt Zusammenfassung; Abbildungen Spalte 1, Absatz 4 - Spalte 3, Absatz 14	1-21

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen
PCT/EP2006/010380

C. (Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	DE 38 00 585 A1 (KLÖCKNER-HUMBOLDT-DEUTZ AG) 28. Juli 1988 (1988-07-28) in der Anmeldung erwähnt Zusammenfassung; Abbildungen Spalte 2, Zeile 2 - Zeile 23 Spalte 2, Zeile 66 - Spalte 4, Zeile 53	1-21

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

INTERNATIONALER RECHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehören

Internationales Aktenzeichen
PCT/EP2006/010380

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
US 2984229 A	16-05-1961	KEINE	
DE 10060573 A1	06-09-2001	KEINE	
DE 1203046 B	14-10-1965	KEINE	
DE 19635220 A1	14-05-1998	KEINE	
DE 3929115 A1	07-03-1991	KEINE	
EP 1462636 A2	29-09-2004	FR 2853013 A1	01-10-2004
DE 4433500 A1	28-03-1996	KEINE	
EP 1647699 A	19-04-2006	DE 102004050601 A1 US 2006081223 A1	27-04-2006 20-04-2006
DE 4418856 A1	07-12-1995	KEINE	
DE 10154455 A1	15-05-2003	KEINE	
DE 3800585 A1	28-07-1988	KEINE	

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Espacenet

Bibliographic data: FR2220679 (A1) — 1974-10-04

Fuel control system for I.C. engine - supplies light or heavy fuel, according to use of engine, to injection pump

Inventor(s):

Applicant(s): SERVEQUIP [FR] ± (SERVEQUIP,FR, ; SERVEQUIP)

Classification:
- **international:** ***F02D19/06;*** (IPC1-7): F02D19/06
- **cooperative:** **F02D19/0618 (EP)**; **F02D19/0676 (EP)**; Y02T10/30 (EP)

Application number: FR19730008061 19730307

Priority number(s): FR19730008061 19730307

Also published as: FR2220679 (B1)

Abstract of FR2220679 (A1)

The engine fuel pump is supplied from either of two fuel tanks through an electromagnetic three-way valve. Excess fuel from the pump is returned to either tank through another three way valve. The valve motors are energised by a circuit containing a switch controlled by a manual lever. The flow valve is operated immediately by the controls but the return valve is operated through an adjustable delay timer. This ensures that fuel already in the pipes is returned to the correct tank.

(19) RÉPUBLIQUE FRANÇAISE

INSTITUT NATIONAL
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PARIS

(11) N° de publication : **2.220.679**
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DEMANDE DE BREVET D'INVENTION

1re PUBLICATION

(22) Date de dépôt ..... 7 mars 1973, à 14 h 14 mn.
(41) Date de la mise à la disposition du public de la demande..... B.O.P.I. — «Listes» n. 40 du 4-10-1974.

(51) Classification internationale (Int. Cl.) **F 02 d 19/06.**

(71) Déposant : Société anonyme dite : SERVEQUIP, résidant en France.

(73) Titulaire : *Idem* (71)

(74) Mandataire : Cabinet Faber.

(54) **Installation de contrôle de l'alimentation d'un moteur sélectivement en gas-oil et en fuel-oil.**

(72) Invention de :

(33) (32) (31) Priorité conventionnelle :

Vente des fascicules à l'IMPRIMERIE NATIONALE, 27, rue de la Convention - 75732 PARIS CEDEX 15

L'invention concerne le contrôle de l'alimentation d'un moteur à combustion interne sélectivement en gas-oil et en fuel-oil, notamment les moteurs de pompes à béton montées sur véhicules automobiles.

Lorsqu'une pompe à béton est installée d'une manière immobile sur un chantier, il est autorisé de l'actionner au moyen d'un moteur alimenté en fuel-oil, c'est-à-dire, un carburant détaxé et par conséquent bon marché. Mais lorsque cette même pompe est montée sur un véhicule automobile, il n'est pas permis que le moteur d'entrainement de ce véhicule soit alimenté également en fuel-oil, on l'alimente donc en général en gas-oil, c'est-à-dire en carburant non détaxé, et par conséquent onéreux.

En moyenne, on a constaté que les temps d'utilisation d'une pompe à béton se partagent approximativement en 3/5 pour le travail de pompage du béton à poste fixe et 2/5 pour les déplacements de la pompe.

Au lieu d'avoir un moteur alimenté à partir d'un réservoir de fuel-oil pour l'actionnement de la pompe et un autre moteur alimenté à partir d'un réservoir de gas-oil pour l'entrainement du véhicule, il serait intéressant d'avoir un moteur unique que l'on puisse accoupler sélectivement à la pompe ou à la transmission d'entrainement des roues du véhicule pourvu que l'on soit assuré que l'alimentation du moteur se fasse dans chacune des deux utilisations, à partir du réservoir de carburant correspondant et qu'au début du fonctionnement au gas-oil le reliquat de fuel-oil demeuré dans les diverses tuyauteries et accessoires, tels que filtres et injecteurs, retourne bien dans le réservoir de fuel-oil.

A cet effet, on va donc utiliser une installation de contrôle de l'alimentation d'une pompe à injection d'un moteur unique sélectivement à partir d'un réservoir de gas-oil ou d'un réservoir de fuel-oil, selon que le moteur est accouplé à un premier ou à un second appareil d'utilisation, notamment d'un moteur de pompe à béton montée sur un véhicule automobile mû par le même moteur, accouplé sélectivement à la pompe ou à une transmission d'entrainement des roues motrices du véhicule par un embrayage sélectif à commande manuelle et, suivant l'invention, l'entrée de la pompe d'alimentation du moteur est reliée

aux deux réservoirs de carburant par l'intermédiaire d'une première électro-valve d'amenée à trois voies et la sortie de ladite pompe est reliée semblablement aux deux réservoirs de carburant par l'intermédiaire d'une seconde électro-valve de retour à trois voies, les deux électro-valves étant placées sous le contrôle de l'organe de commande manuelle de l'embrayage sélectif du moteur, la première directement et la seconde par l'intermédiaire d'un relais temporisé, de façon telle que le retour de fuel-oil se fasse vers le réservoir de fuel-oil, non seulement lorsque l'alimentation de la pompe du moteur est assurée en fuel-oil, mais aussi pendant la durée de la temporisation dudit relais au début de l'alimentation de la pompe du moteur en gas-oil.

Grâce à une telle installation, le fait même d'accoupler le moteur à la pompe à béton ou bien à la transmission d'entraînement des roues du véhicule assure automatiquement l'alimentation de la pompe à injection du moteur à partir du réservoir de carburant approprié et, de plus, le reliquat de fuel-oil demeuré dans les conduites et accessoires ne risque pas de retourner dans le réservoir de gas-oil pendant le début du fonctionnement du moteur au gas-oil.

L'invention sera mieux comprise à la lecture de la description qui va suivre et à l'examen du dessin annexé dont la figure unique est un schéma d'une installation de contrôle de l'alimentation d'un moteur de pompe à béton suivant l'invention.

Sur le schéma, on a indiqué en 1 un moteur qui peut être accouplé, sélectivement, à une pompe à béton et aux roues d'un véhicule sur lequel est montée ladite pompe, au moyen d'un embrayage sélectif placé sous le contrôle d'un levier à commande manuelle 2 que l'on peut placer, sélectivement, dans l'une ou l'autre de deux positions correspondantes désignées respectivement par 2C et 2R sur le schéma, à savoir une position "chantier" pour l'entrainement de la pompe et une position "route" pour les déplacements.

Lorsque le moteur 1 est accouplé à la pompe à béton, sa pompe à injection 4 est alimentée à partir d'un réservoir 5 de fuel-oil par l'intermédiaire d'une électro-valve d'amenée à trois voies 6, dans sa position de repos, le levier 2 de sélection étant dans la position 2C. Lorsque le moteur 1 est accou-

plé aux roues du véhicule par la mise enposition du levier de sélection 2 dans la position 2R, la pompe à injection 4 du moteur est alimentée à partir d'un autre réservoir 7 de gas-oil, par l'intermédiaire de la même électro-valve 6en position de travail.

L'électro-valve est donc reliée d'une part, à l'entrée de la pompe à injection 4 par une conduite 11 et, d'autre part, aux deux réservoirs de carburant 5 et 7 par deux conduites 13 et 14, respectivement.

La sortie de la pompe à injection 4 est reliée par une conduite 16 à une électro-valve de retour 17 qui est reliée, à son tour, aussi aux deux réservoirs de carburant 5 et 7 par deux conduites 18 et 19 respectivement.

Dans sa position de repos l'électro-valve de retour 17 met la sortie de la pompe à injection 4 en communication avec le réservoir de fuel-oil 5, tandis que lorsqu'elle est excitée elle la met en communication avec le réservoir de gas-oil 7.

Les deux électro-valves 6 et 17 sont alimentées à partir d'une source de courant appropriée, telle qu'une batterie d'accumulateuns 21, par l'intermédiaire d'un interrupteur 22 fermé lorsque le levier de sélection 2 est dans la position 2R de déplacement du véhicule, de préférence sous le contrôle du contact 24 de marche du moteur 1, muni d'un témoin lumineux 25. Toutefois, l'alimentation de l'électro-valve d'amenée 6 se fait directement à partir de l'interrupteur 22, tandis que celle de l'électro-valve de retour 17 se fait par l'intermédiaire d'un relais 26 temporisé par exemple pour une durée de deux minutes. On peut avantageusement utiliser à cet effet, un relais à temporisation réglable par exemple de 0 à 180 secondes.

Le fonctionnement de l'installation est le suivant :

pour faire fonctionner la pompe à béton, on place le levier sélecteur 2 dans la position "chantier" 2C. Le contact 24 étant fermé, le moteur 1 en fonctionnement entraine par conséquent la pompe à béton et sa pompe à injection 4 est alimentée en fuel-oil bon marché à partir du réservoir 5 par la conduite 13, l'électro-valve d'amenée 6 au repos et la conduite 11. Le retour de carburant de la pompe à injection 4 se fait par la conduite 16, l'électro-valve de retour 17en position de repos et la conduite 18.

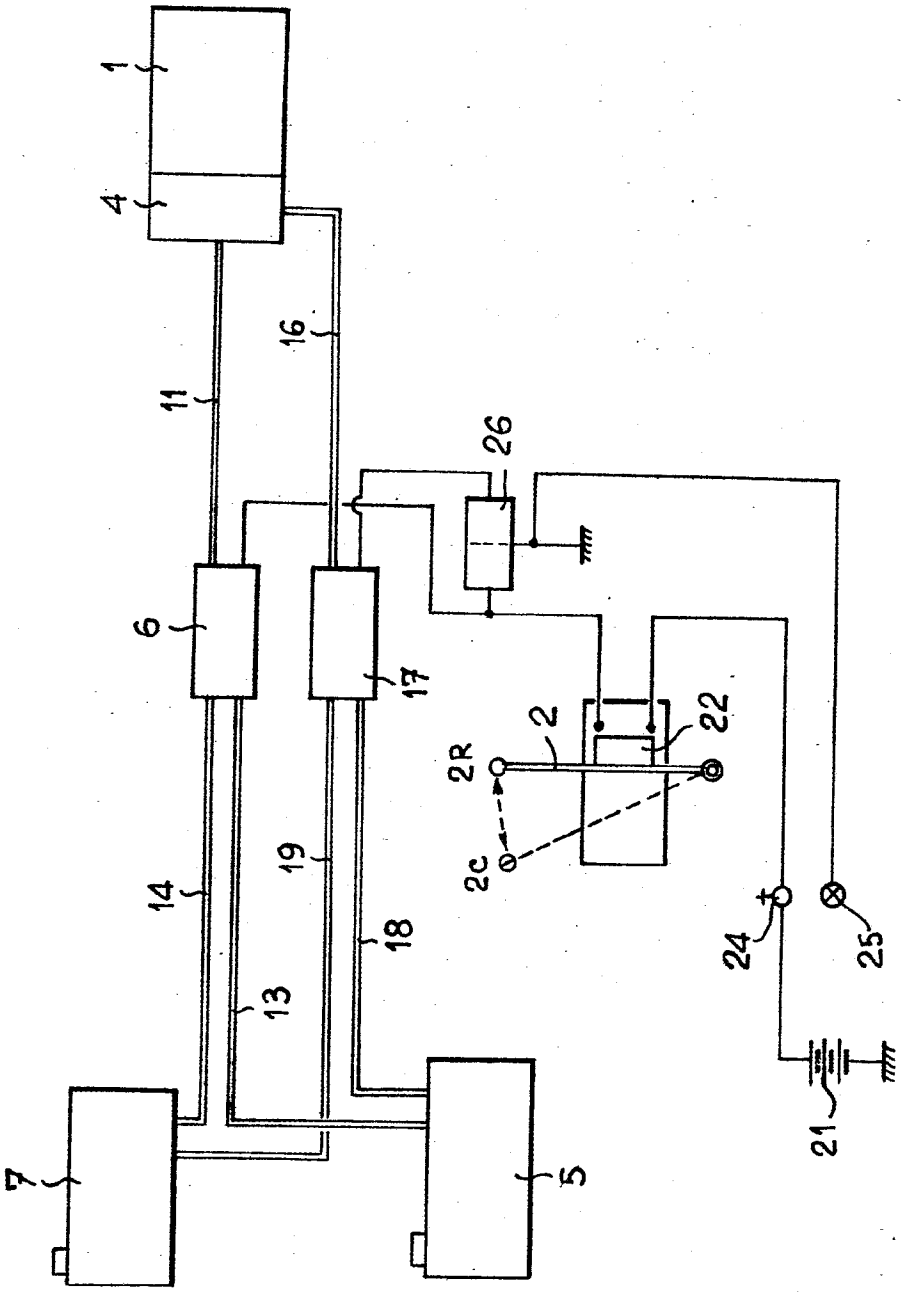
Si l'on a besoin de déplacer la pompe à béton, on doit

amener le levier sélecteur 2 dans la position "route" 2R de manière à assurer l'accouplement du moteur 1 aux roues du véhicule. Dans cette position, l'électro-valve d'amenée 6 est immédiatement mise en position de travail et la pompe à injection 4 du moteur est alimentée en gas-oil cher par la conduite 14, l'électro-valve d'amenée 6 en position de travail, et la conduite 11. Dès le début du fonctionnement du moteur dans cette condition, le relais temporisé 26, bien qu'alimenté aussi, laisse encore, pendant une durée d'environ deux minutes l'électro-valve de retour 17 en position de repos, de sorte que le reliquat du carburant précédemment utilisé, c'est-à-dire du fuel-oil bon marché qui se trouvait encore dans les conduites et accessoires retourne par la conduite 16, l'électro-valve 17 de retour au repos et la conduite 18, au réservoir 5 de fuel-oil. A l'expiration du temps de temporisation, on est certain que tout le circuit de retour est purgé de fuel-oil bon marché et, à ce moment, le relais 26 assure la mise de l'électro-valve de retour 17 en position de travail pour permettre le retour de gas-oil de la pompe à injection, par la conduite 19, au réservoir 7 de gas-oil cher.

Bien entendu, l'invention n'est pas limitée au mode de réalisation décrit et représenté ; on peut y apporter des modifications, suivant les applications envisagées, sans sortir, pour cela, du cadre de l'invention.

REVENDICATION

Installation de contrôle de l'alimentation d'une pompe à injection de moteur sélectivement à partir d'un réservoir de gas-oil ou d'un réservoir de fuel-oil, selon que le moteur est accouplé à un premier ou à un second appareil d'utilisation, notamment d'un moteur de pompe à béton monté sur un véhicule automobile mû par le même moteur, accouplé sélectivement à la pompe ou à une transmission d'entrainement des roues motrices du véhicule par un embrayage sélectif à commande manuelle, ladite installation étant caractérisée en ce que l'entrée de la pompe d'alimentation du moteur est reliée aux deux réservoirs de carburant par l'intermédiaire d'une électro-valve d'amenée à trois voies et la sortie de ladite pompe est reliée semblablement aux deux réservoirs de carburant par l'intermédiaire d'une électro-valve de retour à trois voies également, les deux électro-valves étant placées sous le contrôle de l'organe de commande manuelle de l'embrayage sélectif du moteur, la première directement et la seconde par l'intermédiaire d'un relais temporisé, de façon telle que le retour de fuel-oil se fasse vers le réservoir de fuel-oil, non suelement lorsque l'alimentation de la pompe du moteur est assurée en fuel-oil, mais aussi pendant la durée de la temporisation dudit relais au début de l'alimentation de la pompe du moteur en gas-oil.


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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/783,455	Filing Date 02/06/2020	☐ 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 $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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)			
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	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	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 =	
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							TOTAL ADD'L FEE	

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Application Serial No: 16/783,455

Attorney Docket No: CET1090.074
Customer Number: 26629
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 04/14/2022

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

EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
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	Examiner	Art Unit	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification	
1	A	US-			1	1
	B	US-				
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	U	Appendix A
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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FEEDBACK

Top Definitions Quiz Examples

High School Level

offboard

or **off-board** [**awf-bawrd**, **-bohrd**, **of-**] SHOW IPA

adjective

1 not carried, installed, etc., within a vehicle or electronic device:
offboard software to track and control the robot's movement.

2 *Finance.* over-the-counter (def. 1).

verb (used with object) Business

3 to interact and exchange information with (a departing employee) so as to ensure a smooth transition, protect company assets, etc.

4 to manage the end of a business relationship with (a customer) so as to maintain goodwill, protect confidential data, etc.

JCPenney

QUIZ

QUIZ YOURSELF ON HAS VS. HAVE!

Do you have the grammar chops to know when to use "have" or "has"? Let's find out with this quiz!

QUESTION 1 OF 7

My grandmother _____ a wall full of antique cuckoo clocks.

has

have

TAKE THE QUIZ TO FIND OUT

FEEDBACK

Meet Grammar Coach

Improve Your Writing

ORIGIN OF OFFBOARD

First recorded in 1945–50; off + board

WORDS NEARBY OFFBOARD

off and running, off balance, off-balance sheet reserve, off-base, offbeat, offboard, off-brand, off break, off Broadway, off-budget, off-camera

OTHER DEFINITIONS FOR OFFBOARD (2 OF 2)

off-board

[**awf-bawrd**, **-bohrd**, **of-**] SHOW IPA

adjective, adverb Stock Exchange.

1 outside of a major exchange, as over the counter or between private parties: *an off-board transaction.*

Also **off the board**.

ORIGIN OF OFF-BOARD

First recorded in 1945–50

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HOW TO USE OFFBOARD IN A SENTENCE

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Champion - EX2108, Page 183 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

esemplastic

adjective | [es-em-**plas**-tik, -*uh*m-]

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EXAMINER	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARK J. SARDER, ALEKO D. SOTIRIADES, JAMES J. DEHN, and LEIGH JENISON

Appeal 2022-000142
Application 16/783,455
Technology Center 3700

Before STEFAN STAICOVICI, JEREMY M. PLENZLER, and ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant[1] seeks review, under 35 U.S.C. § 134(a), of the Examiner's decision, as set forth in the Final Office Action dated February 1, 2021, and as further explained in the Advisory Action dated April 16, 2021, rejecting claims 1–5 and 7–19. The Examiner indicates that claim 6 would be allowable if rewritten in independent form and if the double patenting rejection were overcome. We have jurisdiction under 35 U.S.C. § 6(b).

We *reverse*.

---

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Champion Power Equipment, Inc. as the real party in interest. Appeal Br. 1.

BACKGROUND

The disclosed subject matter "relate[s] generally to dual fuel generators, and more particularly, to an apparatus and method for delivering liquid fuel and gaseous fuel to a dual fuel generator." Spec. ¶ 2. Claims 1, 11, and 16 are independent. Claim 1 is reproduced below, with emphasis added to certain claim language:

> 1. A generator and fuel delivery system comprising:
>
> a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;
>
> *a fuel regulator system located off-board the generator* and comprising a first stage and a second stage, the fuel regulator system configured to:
>
> regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and
>
> regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

Appeal Br. 20 (Claims App.) (emphasis added).

Champion - EX2108, Page 187 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

REFERENCES

The Examiner relies on the following references:

Name	Reference	Date
Pursifull	US 2011/0168133 A1	Published July 14, 2011
Bassguitarist1985, *Yamaha EF2000iS TriFuel Conversion: Overview & Installation Tips*, (posted January 3, 2014), https://www.youtube.com/watch?v=caZawwDaRQg ("Bassguitarist1985").		
NoOutage.com, *Standby Generator Set*, (posted November 13, 2006), web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm ("Nooutage").		

REJECTIONS

1. Claims 1, 4, 7, 11, 14, 16, and 18 stand rejected under 35 U.S.C. § 102(a)(1) as anticipated by Bassguitarist1985.

2. Claims 2, 12, and 17 stand rejected under 35 U.S.C. § 103 as unpatentable over Bassguitarist1985.

3. Claims 3, 8–10, 13, and 19 stand rejected under 35 U.S.C. § 103 as unpatentable over Bassguitarist1985 and Nooutage.

4. Claims 5 and 15 stand rejected under 35 U.S.C. § 103 as unpatentable over Bassguitarist1985 and Pursifull.

5. Claims 1–19 stand provisionally rejected under the doctrine of obviousness-type double patenting as unpatentable over claims 1–17, 21, and 22 of U.S. Patent Application No. 16/191,503.

DISCUSSION

Rejection 1 – The rejection of claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. § 103

Each of the three independent claims—1, 11, and 16—requires that the fuel regulator system is "located off-board" the generator. *See* Appeal Br. 20, 22, 23 (Claims App.). For these requirements, the Examiner cites to

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16:48–18:10 in Bassguitarist1985 and states that the regulators "are shown . . . set off of [the generator] outside it." Final Act. 2.

We first construe "located off-board," as recited in the independent claims. Appellant argues that the Specification defined that phrase as "located remotely." Appeal Br. 4 (citing Spec. ¶ 25). The Examiner responds that the paragraph of the Specification highlighted by Appellant "give[s] no exact definitions," and then the Examiner provides a definition from dictionary.com: "not carried, installed, etc., within a vehicle or electronic device." Ans. 17; *see* App'x A (printout of the dictionary.com entry for "off-board" (last visited April 6, 2022)). According to the Examiner, "we can ascertain that what is *intended* is that of the normal definition: 'the device is not carried or installed *within*' the generator." Ans. 17. The record supports Appellant's proposed construction.

The first sentence of the paragraph highlight by Appellant provides: "In accordance with an exemplary embodiment of the invention, fuel regulator system 39 includes both the primary and secondary regulators, or a custom single regulator, but in any case *is located remotely, or off-board*, from dual fuel generator 20." Spec. ¶ 25 (emphasis added). We view the use of "or" in this passage—similar to the use of "i.e."—as clearly setting forth a definition of the term "off-board," as well as expressing an intent to explain the use of that term. *See Luminara Worldwide, LLC v. Liown Elecs. Co.*, 814 F.3d 1343, 1353 (Fed. Cir. 2016) ("To act as a lexicographer, a patentee must 'clearly set forth a definition of the disputed claim term' and 'clearly express an intent to redefine the term.'" (quoting *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012))); *Edwards Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1334 (Fed. Cir.

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2009) ("[U]se of 'i.e.' signals an intent to define the word to which it refers.").

When an applicant sets forth in a specification a definition of a claim term that potentially differs from its plain and ordinary meaning, the stated definition governs. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc) ("[O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs."). The Examiner's position that Appellant "intended" to use "off-board" as defined on dictionary.com is not supported by the record, and in fact, is contradicted by the express definition discussed above. Ans. 17 (emphasis omitted); *see* Spec. ¶ 25; *Phillips*, 415 F.3d at 1316. This construction of "located off-board" is supported by the Figures, which show the regulator on the fuel regulator system and located *remotely* from the generator. *See* Spec., Fig. 1 (showing regulators 42/44 on regulator system 39 rather than generator 20), ¶¶ 23–25 (describing same)).

We turn now to assessing whether the relied-upon aspects of Bassguitarist1985 disclose a regulator system "located off-board" the generator, as construed above. Appellant argues that Bassguitarist1985 does not disclose a regulator system that is located "remotely" from the generator, but instead, discloses three possibilities, each with the regulator "physically coupled/mounted directly to the generator": "with the demand regulator mounted either directly adjacent the generator intake, on the back cover of the generator housing, or to/on a foot of the generator using a bracket." Appeal Br. 4–5 (citing Bassguitarist1985 at 10:00, 11:40, 14:55, 19:40). We agree with Appellant that *none* of the three disclosed possibilities include the

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regulator located "remotely" from the generator because, in each of those options, the regulator is instead located *with* the generator.

The Examiner argues, in the context of the option with the regulator attached to the foot of the generator, that the user "is attaching it *remotely* via a metal bracket, rather than fastening it directly to the generator." Ans. 18. We disagree with the Examiner's understanding of "remotely." Even if the regulator is attached to the generator *indirectly*—i.e., with an intervening metal bracket—the regulator is still located *with* (rather than remotely from) the generator. *See* Reply Br. 6 (noting that the narrator in Bassguitarist1985 describes how the regulator mounted with the bracket is "just going to be hanging off the side of the machine").

In addition, the Examiner notes that the narrator discusses how "there is no right or wrong way" to mount the regulator. Ans. 18 (citing Bassguitarist1985 at 14:54). We do not view this statement by the narrator as expanding the mounting locations for the regulator beyond the three options listed above. Instead, we view this statement as indicating that, *among those three options*, each is equally reasonable.

For these reasons, we do not sustain the rejection of independent claims 1, 11, and 16, and also do not sustain the rejection of claims 4 and 7 (which depend from claim 1), claim 14 (which depends from claim 11), and claim 18 (which depends from claim 16).

Rejections 2 through 4

Claims 2, 3, 5, and 8–10 depend from claim 1; claims 12, 13, and 15 depend from claim 11; and claims 17 and 19 depend from claim 16. Appeal Br. 20–24 (Claims App.). The Examiner's added reliance on Nooutage (in Rejection 3) and Pursifull (in Rejection 4) does not remedy the deficiencies in the rejection based on Bassguitarist1985, discussed above, regarding

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claims 1, 11, and 16 (*see supra* Rejection 1) and the Examiner does not propose modifying Bassguitarist1985 to satisfy those deficiencies. Thus, for the same reasons discussed above, we do not sustain the rejection of claims 2, 3, 5, 8–10, 12, 13, 15, 17, and 19.

Rejection 5 – The Provisional Double Patenting Rejection of claims 1–19

The Examiner provisionally rejected claims 1–19 on the ground of the nonstatutory double patenting in view of claims 1–17, 21, and 22 of U.S. Patent Application No. 16/191,503. Final Act. 7–8. Because the '503 Application is pending (and currently on appeal to the PTAB in Appeal 2022-001059), the claims in that Application are subject to further amendment. Thus, this Rejection is not yet ripe for review and we do not reach it in this Appeal. *See Ex parte Moncla*, 95 USPQ2d 1884, 1885 (BPAI 2010) (precedential).

CONCLUSION

We *reverse* the Examiner's rejection of claims 1–5 and 7–19.

More specifically, we (1) *reverse* the decision to reject claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. § 102(a)(1), and (2) *reverse* the decision to reject claims 2, 3, 5, 8–10, 12, 13, 15, 17, and 19 under 35 U.S.C. § 103.

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DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4, 7, 11, 14, 16, 18	102(a)(1)	Bassguitarist1985		1, 4, 7, 11, 14, 16, 18
2, 12, 17	103	Bassguitarist1985		2, 12, 17
3, 8–10, 13, 19	103	Bassguitarist1985, Nooutage		3, 8–10, 13, 19
5, 15	103	Bassguitarist1985, Pursifull		5, 15
1–19		Provisional Obviousness-type Double Patenting[2]		
Overall Outcome				1–5, 7–19

REVERSED

[2] As explained above, we do not reach this Rejection.

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

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARK J. SARDER et al.

Appeal 2022-000142
Application 16/783,455
Technology Center 3700

APPEAL DOCKETING NOTICE

The Patent Trial and Appeal Board received the appeal in the above-identified application from the Technology Center on October 14, 2021, and has assigned it the appeal number indicated above.

The recipient of this notice is reminded of its ongoing duty, within 20 days of any change during the proceeding, to update its mandatory notices to identify the real party-in-interest and each judicial or administrative proceeding that could affect, or be affected by, the Board proceeding. 37 C.F.R. § 41.8. For example, another docketed appeal in a related application may have the potential to affect, or be affected by, the Board proceeding.

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Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

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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REPLY BRIEF RESPONSIVE TO EXAMINER'S ANSWER MAILED AUGUST 13, 2021

Dear Sir:

This Reply Brief is being filed in Response to the Examiner's Answer mailed on August 13, 2021.

REPLY BRIEF

In the Examiner's Answer mailed August 13, 2021, the Examiner maintained the rejection of claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaRQg); the rejection of claims 2, 12, and 17 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985; the rejection of claims 3, 8-10, 13, and 19 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm); the rejection of claims 5 and 15 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al. (US Pub. 2011/0168133); the provisional rejection of claims 1-19 on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. 16/191,503; as set forth in the Final Office Action mailed February 1, 2021 (hereinafter "Final Office Action"). *Examiner's Answer*, 08/13/2021, pp. 3-9.

Appellant believes claims 1-19 are patentable over the art of record and stands by the positions set forth in its Appeal Brief filed July 6, 2021. Herein, Appellant limits its remarks to the assertions presented by the Examiner in the Examiner's Answer of August 13, 2021, with it being understood that the following remarks are meant to supplement the remarks previously set forth in its Appeal Brief, and that the Appeal Brief includes the fullest and most complete arguments as to why the rejections of the pending claims are improper and cannot be sustained.

Rejections Under 35 U.S.C. §102(a)(1) as Being Anticipated by Bassguitarist1985

Claims 1, 11, and 16

The Examiner rejected claims 1, 11, and 16 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985.

In the Appeal Brief, Appellant argued that Bassguitarist1985 does not teach or suggest a generator configured to operate on a gaseous fuel supplied from a pressurized

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fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims 1, 11, and 16. *Appeal Brief*, 07/06/2021, pp. 2-13. More specifically, Appellant argued that in each of the mounting arrangements disclosed in Bassguitarist1985, the demand regulator is mounted *on-board* the generator – i.e., physically coupled/mounted directly to the generator – with the demand regulator mounted either directly adjacent the generator intake, on the back cover of the generator housing, or to/on a foot of the generator using a bracket. *Id.* at pp. 4-5 (citing Bassguitarist1985, 10:00, 11:40, 14:55, 19:40). Appellant argued that, as explained in paragraph [0025] of the Specification, the term "off-board" means "located remotely." *Id.* at p. 4. Additionally, Appellant argued that to the extent that Bassguitarist1985 teaches a generator "free of any pressure regulator," as asserted by the Examiner, Appellant notes that such a teaching is only provided in the context of the EF2000iS Yamaha generator as it is configured *before the conversion* thereof to a tri-fuel generator (i.e., when it is a gasoline only generator). *Id.* at p. 5. Appellant argued that in such a configuration, it is not a generator that is configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line as called for in claims 1, 11, and 16 – but instead is only configured to operate on gasoline. *Id.* Appellant further stated that the written description associated with the Bassguitarist1985 screen clearly says, "'I'll be fabricating a simple sheet metal bracket to mount underneath the machine and mount the demand regulator.'" *Id.* at p. 8 (Quoting *Bassguitarist1985*, *Description*).

Bassguitarist1985 Fails to Teach the Claim Elements

In maintaining the rejection of claims 1, 11, and 16, the Examiner stated that Bassguitarist1985 "shows a generator, a Yamaha EF2000iS, which is modified to operate upon gaseous fuel with a dual regulator system. The speaker states he intends to attach the 'Demand regulator' to the exterior via a metal bracket, but also states 'there is no right or wrong way' at 14:54." *Examiner's Answer*, p. 18. The Examiner contended that "[t]hus the shown system can be operated as shown- making use of the shown quick connect lines -- and if it is *capable* of being operated as shown it immediately discloses

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the regulators being off-board as they are not even attached to the system at all." *Id.* (emphasis original). The Examiner also contended that Appellant's "argument is based upon Bassguitarist1985 disclosing their intention to Velcro the demand regulator to the exterior of the generator." *Id.* at p. 16.

Contrary to the Examiner's assertion, Bassguitarist1985 discusses the only three options for locating the demand regulator upon conversion to tri fuel: (1) mounting the demand regulator outside the generator intake by drilling into the generator housing, (2) mounting the demand regulator on the back cover of the generator housing, or (3) mounting the demand regulator to/on a foot of the generator using a bracket. *Id.*; *Bassguitarist1985*, 18:49-20:30; *Id.* at 10:00, 11:40, 14:55, 19:40. While the Examiner asserted that Bassguitarist1985 said, "'there is no right or wrong way' at 14:54" (*Examiner's Answer*, p. 18), that statement was made with respect to selection of the second of the three locations listed above where the demand regulator is mounted on the back cover of the generator housing. *Bassguitarist1985*, 14:48. Further, contrary to the Examiner's statement, Appellant made no argument in the Appeal Brief relating to an "intention to Velcro the demand regulator," and Bassguitarist1985 provides no such disclosure. Bassguitarist1985 only discloses Velcro with respect to coupling a tachometer/hour meter to the generator. *Id.* at 10:15.

Further, the generator is actually shown in a disassembled state without the motor snorkel coupled to the carburetor to provide propane or natural gas to the engine from the demand regulator. *See Bassguitarist1985*, 9:57. That is, the demand regulator couples to the motor snorkel via a hose for incoming propane or natural gas, but the hose and motor snorkel are not attached to the carburetor. *Id.* at 4:18. The carburetor is only configured for operation on gasoline. *Id.* Thus, the demand regulator is not fluidically connected and the generator is not "*capable* of being operated as shown" with respect to the demand regulator as asserted by the Examiner on page 18 of the Examiner's Answer. *Examiner's Answer*, p. 18. (emphasis original). To conclude that the generator of Bassguitarist1985 is configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims

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1, 11, and 16, is to distort the teachings therein and is not supported by the disclosure of Bassguitarist1985.

The Examiner maintained the rejection by asserting that "Appellant gives no exact definitions" of "off-board" and that "we can ascertain that what is *intended* is that of the normal definition: 'the device is not carried or installed *within*' the generator." *Examiner's Answer*, p. 17. (emphasis original). The Examiner then argued the following:

> [F]or the sake of argument, it will be assumed that the regulator *must* be attached in some fashion.... In this case the regulator is still 'off-board' as disclosed by user in the video. He is attempting to attach it via a metal bracket to the exterior of the generator.... He is not *placing the regulator within the generator*. Not only is he attaching it to the exterior, but he is attaching it *remotely* via a metal bracket, rather than fastening it directly to the generator. As transcribed by appellant, Bassguitarist1985 states, "[Get] a piece of sheet metal and you know throw some mounting screws on there and call it a day... so it's just going to be *hanging off the side of the machine*." This is, by-definition, 'remote' and by-definition "off-board."

Id. at p. 18. (emphasis original).

The Examiner's assertion that a demand regulator is "off-board" a generator because it is allegedly not "within the generator" ignores the standard of a broadest reasonable interpretation of the claim language, ignores the clear teaching of the present claims/Specification, and distorts that which is disclosed in Bassguitarist1985. MPEP §2111 states that "[t]he broadest reasonable interpretation does not mean the broadest possible interpretation." "Rather, the meaning given to a claim term must be consistent with the ordinary and customary meaning of the term (unless the term has been given a special definition in the specification)... [and] the use of the claim term in the specification and drawings... [, 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)). "The plain meaning of a term means the ordinary and customary meaning given to the term by those of ordinary skill in the art at the time of the invention... [and] may be evidenced by a variety of sources, including the words of the claims themselves, the specification, drawings, and prior art." "However, the best source for determining the meaning of a

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claim term is the specification - the greatest clarity is obtained when the specification serves as a glossary for the claim terms." *MPEP §2111.01(I)* (citing *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)).

The Examiner's construction of "off-board" as "'not carried or installed within' the generator" on page 17 of the Examiner's Answer based solely on the definition of "offboard" at Dictionary.com is simply too broad in view of both other definitions of "off-board" and, more importantly, the Specification. Initially, Appellant notes that few dictionaries provide relevant definitions for "off-board" (or even "offboard" or "off board"), with most focusing on the field of finance or business. *See, e.g.*, "off-board," *Merriam-Webster Dictionary*, 2021, https://www.merriam-webster.com/dictionary/off-board (13 October 2021); "off-board," *Collins English Dictionary*, 2021, https://www.collinsdictionary.com/us/dictionary/english/off-board (13 October 2021). Further, other definitions of "off-board" are narrower at least with respect to the "within" language cited by the Examiner. For example, other definitions for "off-board," "offboard," or "off board" include "*Not on or in* a means of transportation" and "A chip or other hardware component that is *not directly attached to* a printed circuit board or motherboard." "off board," *Wiktionary*, 2021, https://en.wiktionary.org/wiki/off_board (13 October 2021) (emphasis added); "offboard," *YourDictionary*, 2021, https://www.yourdictionary.com/offboard (13 October 2021) (emphasis added). In view of these definitions, a skilled artisan would not consider a device on or attached to another device as being "off-board," as contended by the Examiner.

Furthermore, the Specification provides insight as to the meaning of "off-board" that is consistent with these definitions. In the context of the generator of claims 1, 11, and 16, the Specification defines "off-board" to mean "located remotely." *Specification*, ¶[0025]. In the present case, a skilled artisan would readily recognize that the term "remotely" means "without direct contact or control: from a distance" or "[f]rom a distance; without physical contact." *See* "remotely," *Merriam-Webster Dictionary*, 2021, https://www.merriam-webster.com/dictionary/remotely (13 October 2021); "remotely," *Oxford English Dictionary*, 2021, https://www.lexico.com/en/definition/remotely (13 October 2021). These ordinary and customary meanings of "remotely" are consistent

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with each other and with the use of the term "remotely" or "located remotely" in the Specification and Drawings. The Specification discloses a fuel regulator system 39 including a primary pressure regulator 42 and a secondary pressure regulator 44 "located remotely, or off-board, from dual fuel generator 20" and also discloses that, "since generator 20 can be used as a gasoline only generator, secondary pressure regulator 44 is mounted off-board the generator to reduce size and cost of the generator." *Specification*, ¶¶[0024]-[0025]. The Specification further discloses that a dual stage pressure regulator 162 mounts in a similar manner. *Id.* at ¶[0051]. The Drawings confirm this by clearly illustrating in FIGS. 1, 5, and 6 that secondary pressure regulator 44/dual stage pressure regulator 162 is "without direct contact," "without physical contact," and "from a distance" with respect to generator 20 consistent with the definition of "located remotely" and "off-board."

When the fuel regulator system located off-board a generator, as called for in claims 1, 11, and 16, is given the proper broadest reasonable interpretation consistent with the requirements of MPEP §2111 and MPEP §2111.01, it is clear that Bassguitarist1985 fails to teach or suggest what is called for in claims 1, 11, and 16. That is, as set forth above, Bassguitarist1985 discloses that all three locations of the demand regulator for conversion to tri-fuel operation are mounted <u>on</u> the generator. *Bassguitarist1985*, 10:00, 11:40, 14:55, 19:40. The Examiner's position regarding a statement made by the narrator of the Bassguitarist1985 video that a demand regulator mounted with the bracket is "just going to be hanging off the side of the machine" (*Examiner's Answer* p. 18; *See Appeal Brief*, p. 8 (Appellant's partial transcription of Bassguitarist1985 at 18:49-20:30)), which is alleged by the Examiner to be "by-definition, 'remote' and by-definition 'off-board'" (*Examiner's Answer* p. 18), is not consistent with the proper broadest reasonable interpretation thereof as used in the present application according to the requirements of MPEP §2111 and MPEP §2111.01. In other words, the bracket of Bassguitarist1985 mounts the demand regulator to/on a foot of the generator adjacent the back cover (*Id.* at 19:40) and is therefore not "without direct contact" nor "from a distance" of the generator. Thus, Bassguitarist1985 does <u>not</u> disclose that a demand regulator is mounted "off-board" or "located remotely" from the

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generator. For this reason alone, Bassguitarist1985 does not anticipate claims 1, 11, or 16 under 35 U.S.C. §102(a)(1).

Examiner Improperly Relied on Multiple References

Further, as stated on page 9 of the Appeal Brief, while it may appear that rejections of claims 1, 11, and 16 under 35 U.S.C. §102 is based on the Bassguitarist1985 video, the Examiner improperly relied on a second YouTube video in support of the rejections thereof. In the Response to Arguments section of the Final Office Action, the Examiner referenced "Chuck Webb (Chuck Webb, https://youtu.be/L6TB9nqbqtg, 'Yamaha ef200is running on the propane quick connect pulling the Coleman air condition')" and asserted that "Chuck Webb is shown at 0:00 with an identical Yamaha generator having an on demand regulator mounted to a wagon nearby separate from the generator." *Final Office Action*, p. 9.

Initially, as explained on page 10 of the Appeal Brief, Chuck Webb is not available as prior art to the present application because it was published on September 24, 2017, more than two years after the June 12, 2015 effective filing date of the present application. Regardless, while the Examiner asserted that Chuck Webb discloses an "on demand regulator," Chuck Webb does not disclose a fuel regulator system comprising both a first stage and a second stage. *See Chuck Webb*, 3:10. Thus, Chuck Webb is not prior art to the claimed invention and is not relevant to support a rejection under 35 U.S.C. §102(a)(1) with respect to the present application. *See 35 U.S.C. §102*.

However, in the Examiner's Answer, the Examiner presented the following argument:

> Chuck Webb was merely exemplary art used to further describe examiner's position. It is noted that while it is after the filing date of the instant invention, the art shown is that of Bassguitarist1985 and it is shown operating without a regulator attached in any way to the generator. Appellant has made unsupported arguments that Bassguitarist1985 could not be operated as it shown, thus Chuck Webb is simply used to show that this device could be operated as shown in an effort to make an argument with support rather than mere allegations. There is a clear distinction with regards to Chuck Webb, *the reference* is dated after the filing date, *but the art shown* is that from before the filing date (identical art of Bassguitarist1985). Chuck Webb is not material to the rejections, it is

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> merely being used to show that allegations that it is impossible for the art of Bassguitarist1985 to function as it is shown are not supported by any actual factual backing.

Examiner's Answer, p. 18-19. (emphasis original).

Initially, Appellant did not make "unsupported arguments that Bassguitarist1985 could not be operated as it [*sic*] shown" as asserted by the Examiner on page 18 of the Examiner's Answer. Instead, Appellant supported the arguments by stating that "the generator is actually shown in a disassembled state without the snorkel coupled to the carburetor to provide propane or natural gas to the engine from the demand regulator. *See Bassguitarist1985*, 9:57." *Appeal Brief*, p. 9. Further, the Examiner's assertion on page 19 of the Examiner's Answer that "*the art shown* [in Chuck Webb] is that from before the filing date (identical art of Bassguitarist1985)" is incorrect. That is, to the extent that Chuck Webb shows operation of a generator "shown operating without a regulator attached in any way to the generator," as asserted by the Examiner on page 18 of the Examiner's Answer, Bassguitarist1985 does not disclose a generator configured to operate without a regulator attached in any way to the generator. Instead, as stated above, Bassguitarist1985 discloses that all three locations of the demand regulator for tri-fuel operation are mounted on the generator. *Bassguitarist1985*, 10:00, 11:40, 14:55, 19:40.

As stated on pages 10-11 of the Appeal Brief, since Chuck Webb was not part of the substantive rejection of claim 1, 11, or 16 under 35 U.S.C. §102(a)(1), but the Examiner relied upon the disclosure of Chuck Webb to support the rejections thereof, the Examiner failed to clearly articulate the rejections as required by MPEP §706. *Final Office* Action, pp. 2-3, p. 9; *Advisory Action*, 04/16/2021, p. 2-3; *Examiner's Answer*, p. 18-19. Further, contrary to the Examiner's statements, the standard for anticipation is not whether references that do not qualify as prior art show that an earlier claimed invention could work. *See Final Office Action*, p. 9; Advisory *Action*, p. 2-3; *Examiner's Answer*, p. 18-19. Instead, "[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.*, 814 F.2d at 631).

While MPEP §2131.01(III) indicates that, in some circumstances, an "extra reference or evidence can be used to show an inherent characteristic of the thing taught

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by the primary reference" (emphasis omitted), Chuck Webb does not show that Bassguitarist1985 inherently teaches a generator that operates without a regulator attached. As set forth in MPEP §2112(IV), "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis original). MPEP §2112 also states that "[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic." MPEP §2112(VI) (citing *In re Rijckaert*, 9 F.3d 1531, 1534, (Fed. Cir. 1993)). In this case, Bassguitarist1985 only discloses that the demand regulator mounts on-board the generator (*Bassguitarist1985*, 10:00, 11:40, 14:55, 18:49-20:30), and fails to provide any indication that the demand regulator may be mounted off-board the generator. As such, Bassguitarist1985 clearly fails to provide an express or inherent disclosure of the demand regulator mounted off-board from the generator upon conversion to tri-fuel operation.

Chuck Webb cannot be said to correct such a failure. Rather, Chuck Webb provides a disclosure that is entirely separate from that of Bassguitarist1985 and that does not show that a demand regulator mounted off-board from a generator necessarily flows from Bassguitarist1985. That is, Chuck Webb cannot be used to supplement Bassguitarist1985 with a teaching that simply is not present. Hence, the allegations by the Examiner on page 18 of the Examiner's Answer that Chuck Webb allegedly shows a generator "operating without a regulator attached in any way to the generator" cannot be considered "a basis in fact and/or technical reasoning to reasonably support" a determination that such an inherent characteristic necessarily flows from the teachings of Bassguitarist1985. *See MPEP §2112(IV)* (citing *Ex parte Levy*, 17 USPQ2d at 1464). Thus, regardless of whether Chuck Webb "show[s] proof that the *same device* of BassGuitarist1985 is capable of, and been used by someone, operating as an off-board regulator" *(Advisory Action*, p. 3 (emphasis original); *See Examiner's Answer*, p. 18), Chuck Webb is not relevant in supporting a rejection under 35 U.S.C. §102(a)(1) as being

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anticipated by a single prior art reference to BassGuitarist1985. *See MPEP §2131 (citing Verdegaal Bros.*, 814 F.2d at 631).

Not only is Chuck Webb not prior art to the claimed invention, but the Examiner admitted that the rejection "is not contained to what the user in BassGuitarist1985 manages to show or say in their video." *Advisory Action*, p. 3. Thus, since the Examiner admitted that the rejection is not based on the disclosure of Bassguitarist1895 alone, the rejection of claims 1, 11, and 16 as being anticipated by Bassguitarist1985 under 35 U.S.C. §102 is improper and must be reversed. In light of the above, the Examiner did not show that Bassguitarist1985 discloses a fuel regulator system - comprising a first stage and a second stage (claims 1 & 11) or a primary pressure regulator and a secondary pressure regulator (claim 16) – that is located *off-board* the generator, as called for in claims 1, 11, and 16.

Furthermore, in discussing claims 1, 11, and 16 in the Response to Argument section of the Final Office Action, the Examiner also improperly relied upon another reference, Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm), which the Examiner previously cited only in the rejections of dependent claims 3, 8-10, 13, and 19. *Final Office Action*, p.10. As argued on page 11 of the Appeal Brief, since the Examiner relied on Nooutage "for the sake of argument" and "as a side discussion," the Examiner's application of Nooutage to the rejections of claims 1, 11, and 16 has no place in a rejection under 35 U.S.C. §102, which requires anticipation by a single prior art reference. *See MPEP §2131 (citing Verdegaal Bros.*, 814 F.2d at 631). As such, the Examiner's reference to Nooutage is improper and cannot be considered with respect to the rejection of claim 1, 11, or 16 under 35 U.S.C. §102(a)(1).

Further, as stated on page 12 of the Appeal Brief, even assuming *arguendo* that the Examiner's "side discussion" could be considered with respect to the rejections of claims 1, 11, and 16, Nooutage teaches (at best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers. *See Nooutage*. While the Examiner asserted in the Examiner's Answer that "Nooutage shows its system attached to a generator in two different pictures on the reference pages" (Examiner's

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Answer p. 19), the two pictures referred to by the Examiner from Nooutage and reproduced on pages 19-20 of the Examiner's Answer do not show any pressure regulators. *See Nooutage*. Even assuming *arguendo* that the single primary pressure regulator of Nooutage were coupled to each pair of propane tanks in the two pictures from Nooutage reproduced on pages 19-20 of the Examiner's Answer, the single primary pressure regulator would be either hidden behind the propane tanks or under a cover placed over the propane tanks. Thus, Nooutage does not show a generator with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator. As a result, Nooutage does not make up for the deficiencies of Bassguitarist1985 since Nooutage does not disclose a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims 1, 11, and 16.

In addition, the Examiner improperly introduced the following references as showing "the state of the art" in the Examiner's Answer: "Champion Power Equipment, 'How-To: Dual Fuel Generator Start-Up,' https://www.youtube.com/watch?v= CMW2nxPnWpE, Jun 1st, 2014" (hereinafter - "Champion How-To"); "Bigredd110, 'Sportsman 7500 Watt Dual Fuel Generator with Electric Start,' https://www.youtube.com/watch?v=5RQRgUG8OeQ, Feb. 23rd, 2014" (hereinafter – "Bigredd110"); and "GasHoseandRegulators, May 17th, 2014, https://web.archive.org/ web/20140517093401/http://gashosesandregulators.com/" also cited as "https://web.archive.org/web/20140927232814/http://gashosesandregulators.com/lowpres sureregulators.html" (collectively hereinafter – "GasHoseandRegulators"). *Examiner's Answer*, pp. 10, 12. According to the Examiner, these references are "important for the future discussions to see exactly what one of ordinary skill in the art would have in mind when dealing with these devices and what they would know about them." *Id*. at p. 13.

Appellant notes that none of Champion How-To, Bigredd110, nor GasHoseandRegulators were previously applied or discussed as part of the rejection of claim 1, 11, or 16 under 35 U.S.C. §102(a)(1) in the Final Office Action mailed February

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1, 2021. As such, the Examiner's reliance on Champion How-To, Bigredd110, and GasHoseandRegulators as "important for the future discussions to see exactly what one of ordinary skill in the art would have in mind" (*Examiner's Answer*, p. 13) as a basis for rejection of claims 1, 11, and 16 is improper. If the Examiner is now attempting to apply a new ground of rejection, such new grounds of rejection must be "prominently identified in the 'Grounds of Rejection to be Reviewed on Appeal' section under the subheading 'New Grounds of Rejection' of the answer." *MPEP §1207.03* (stating that "even if the prior art reference is cited to support the rejection in a minor capacity, it should be positively included in the statement of rejection and be designated as a new ground of rejection. *In re Hoch,* 428 F.2d 1341, 1342 n.3, 166 USPQ 406, 407 n.3 (CCPA 1970)."). Since the Examiner did not make any statements as to what is "well-known" in the art in the Final Office Action mailed February 1, 2021 that was challenged by the Appellant in the Appeal Brief (*See MPEP* §1207.03(a)(II.)), the Examiner does not have a license thereby to freely base a rejection on Champion How-To, Bigredd110, or GasHoseandRegulators in the Examiner's Answer – and particularly so without even identifying the new rejection in accordance with the MPEP.

Regardless of the above, none of Champion How-To, Bigredd110, and GasHoseandRegulators, disclose a generator comprising either two regulators or a single dual-stage regulator located off board a generator. Initially, the Examiner did not rely on Bigredd110 as disclosing two pressure regulators or a dual-stage regulator. *Examiner's Answer*, p. 12; *See also* Bigredd110, 0:01, 1:40. Despite the Examiner's assertion that Champion How-To discloses "a dual-stage regulator (i.e. two regulators in one) attached to a propane tank at 1:49" (*Examiner's Answer*, p. 10), Champion How-To does not disclose a dual-stage regulator but instead discloses one single stage regulator coupled to a fuel tank. Champion How-To, 1:49, 4:30. While the Examiner stated that GasHoseandRegulators "discloses making use of various twin stage regulation devices to facilitate fuel from typical propane tanks," (*Examiner's Answer*, p. 12) GasHoseandRegulators does not disclose a generator comprising either two regulators or a single dual-stage regulator located off board a generator. *GasHoseandRegulators*.

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Since reliance on Champion How-To, Bigredd110, and GasHoseandRegulators to show the "state of the art" in the Examiner's Answer is improper, and the references do not disclose a generator comprising either two regulators or a single dual-stage regulator located off board the generator, their disclosures do not remedy the deficiencies in Bassguitarist1985. Thus, the cited art fails to teach or suggest a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims 1, 11, and 16.

Conclusion

In light of at least the above, Bassguitarist1985 does not anticipate that which is called for in claim 1, 11, or 16, as anticipation under 35 U.S.C. §102 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*, 868 F.2d at 1236). Furthermore, the Examiner's reliance on Chuck Webb, Nooutage, Champion How-To, Bigredd110, and GasHoseandRegulators are improper in the rejection under 35 U.S.C. §102(a)(1). Appellant therefore believes that each of claims 1, 11, and 16 is patentably distinct from Bassguitarist1985 and respectfully requests reversal of the rejection of claims 1, 11, and 16 and the claims dependent therefrom.

Claims 7 and 18

The Examiner rejected dependent claims 7 and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985.

In the Appeal Brief, Appellant argued that Bassguitarist1985 does not disclose a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator and a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator, as called for in claims 7 and 18. *Appeal Brief*, p. 14.

In maintaining the rejection of claims 7 and 18, the Examiner asserted that, "[i]n Bassguitarist1985 16:48-18:10 a quick connect hose is shown leading from the first

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pressure regulator to 'the secondary pressure regulator' and through this into the dual fuel generator." *Examiner's Answer*, p. 20. The Examiner further contended:

> There is no specification on which end, or if both ends, have the actual quick-connect couple. All that is claimed is that the quick connect hose coupling has one end on the generator and another end on 'an inlet of the gaseous fuel line' and this performs the function of allowing the secondary pressure fuel regulator to be coupled to both sides. This is fulfilled by Bassguitarist1985 which shows one end attached to the generator and another end quick connected to the fuel inlet from the first regulator, this facilitates the flow through the second regulator.

Id. at p. 21-22. The Examiner also reproduced two images of the demand regulator from Bassguitarist1985 and relied on the demand regulator as disclosing a secondary pressure regulator. *Id.* at p. 20-21; *Bassguitarist1985*.

Contrary to the Examiner's assertion, a "quick-connect hose coupling" as called for in claims 7 and 18 is not merely "a quick connect hose" as alleged by the Examiner on p. 20 of the Examiner's Answer. Claims 7 and 18 make clear that a quick-connect hose coupling is not simply "a line" as evident by the claims separately calling for a quick-connect hose coupling and a gaseous fuel line. Further, despite the Examiner's contention that "[a]ll that is claimed is that the quick connect hose coupling has one end on the generator and another end on 'an inlet of the gaseous fuel line' and this performs the function of allowing the secondary pressure fuel regulator to be coupled to both sides" (*Id.* at p. 21), claims 7 and 18 call for a quick-connect hose coupling positioned between an outlet of a secondary pressure regulator and an inlet of a gaseous fuel line. In contrast, Bassguitarist1985 discloses a quick disconnect coupled to an *inlet* of a demand regulator, rather than the *outlet* of the demand regulator. *Bassguitarist1985*, 16:45. That is, Bassguitarist1985 does <u>not</u> disclose a quick disconnect coupled to an outlet of the demand regulator, with Bassguitarist1985 instead disclosing that a barb is attached to the outlet of the demand regulator to couple an open end of the hose that supplies fuel to the generator. *Id.* While the Examiner referred the demand regulator as the "secondary pressure regulator" (*Examiner's Answer*, p. 20-21) the demand regulator does not disclose a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator, as called for in claims 7 and 18.

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Further, the quick disconnect of Bassguitarist1985 that is coupled directly to the inlet of the demand regulator would be coupled to an outlet of any gaseous fuel line connected thereto (*See Bassguitarist1985*, 16:45), and thus does not disclose a quick-connect hose coupling including a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator, as called for in claims 7 and 18.

Accordingly, Bassguitarist1985 does not teach or suggest each and every element of claims 7 or 18. Accordingly, Appellant believes claims 7 and 18 are patentably distinct from Bassguitarist1985 and respectfully requests reversal of the rejection of claims 7 and 18, and the claims depending therefrom.

Rejection Under 35 U.S.C. §103 as Being Unpatentable over Bassguitarist1985 in View of Nooutage

Claims 8, 10 and 19

The Examiner rejected dependent claims 8, 10 (which depends from claim 8 via intervening claim 9), and 19 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Nooutage.

In the Appeal Brief, Appellant argued that the combination of Bassguitarist1985 and Nooutage does not teach or suggest a regulator mounting device secured to a pressurized fuel source with a secondary pressure regulator mounted thereon, as called for in claims 8, 10, and 19. *Appeal Brief*, p. 16. More specifically, Appellant argued that neither Bassguitarist1985 nor Nooutage teaches the arrangement called for in claims 8, 10, and 19 – as instead Nooutage teaches (at best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers and that is attached to the containers via a connecting rod extending between the collars. *Id.* See *Nooutage*; *See Bassguitarist1985*. Appellant further argued that Nooutage does not disclose that a regulator mounting device secures to a pressurized fuel source since the connecting rod disclosed by Nooutage simply rests on the pair of pressurized fuel containers to hold the single primary pressure regulator therebetween. *Appeal Brief*, p. 16.

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In maintaining the rejection of claims 8, 10 and 19, the Examiner reproduced an image from Nooutage that was included in the rejection of the claims on page 5 of the Final Office Action, and of which an annotated version was also included on page 4 of the Advisory Action. *Examiner's Answer*, p. 22. Regarding the reproduced image in the Examiner's Answer, the Examiner stated that Nooutage "shows a mounting bar which is *SECURED* to the collars by way of grooves in the bar held on by gravity." *Id.* at p. 22. According to the Examiner "[d]espite allegations that 'grooves merely rest on collars' not being secure, that would actually be quite secure due to the function of gravity of which they would be subjected." *Id.* The Examiner further asserted, "Nooutage teaches a mounting structure for regulators upon gaseous fuel tanks which is being used to modify the base device of Bassguitarist1985 such that Bassguitarist1985's regulators would and could be modified to be secured to the fuel source." *Id.* at p. 23. Regarding Nooutage, the Examiner admitted "that the dual stage regulator shown is never explicitly stated to be a dual stage regulators (i.e. two regulators)" but asserted that "it would be trivial and obvious to make them such a type of regulators[, with t]he reference of GasHoseandRegulators above discuss[ing] regulators as it pertains to their sale." *Id.*

Initially, the Examiner acknowledged that the regulator of Nooutage "is never explicitly stated to be a dual stage regulators." *Id.* Accordingly, the Examiner's annotated picture of Nooutage from page 4 of the Advisory Action adding a label of "Duel Stage Regulator" is unsupported by the disclosure of Nooutage, as Nooutage discloses (at best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers. *Nooutage.* While the Examiner stated the "reference of GasHoseandRegulators above discusses regulators as it pertains to their sale" (*Examiner's Answer*, p. 23), GasHoseandReglators was not applied in the rejection of claims 8, 10 or 19 in the Final Office Action. For at least the reasons discussed above with respect to claim 1, 11, and 16, the Examiner's reliance on GasHoseandRegulators as a basis for rejection of claims 8, 10 and 19 is improper. Further, Nooutage (at best) requires a particular single primary pressure regulator that is shared by a pair of pressurized fuel containers and that is attached to the containers via a connecting rod extending between the collars. *See Nooutage*. Without any disclosure that a different

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regulator would mount properly on the connecting rod, or receive and supply fuel properly from the pair of pressurized fuel containers, etc., integrating a different regulator (e.g. a regulator from GasHoseandRegulators or Bassguitarist1985) in to the specific arrangement of Nooutage would not be obvious to one skilled in the art absent improper hindsight gleaned from the present application. 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; *see KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742 (U.S. 2007).

Further, Nooutage does not disclose a regulator mounting device secured to a pressurized fuel source as called for in claim 8, or that a regulator mounting device secures to a collar of a pressurized fuel container as called for in claims 10 and 19. As set forth in the MPEP §2143.03, "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson,* 424 F.2d 1382, 1385 (CCPA 1970). "The subject matter of a properly construed claim is defined by the terms that limit the scope of the claim when given their broadest *reasonable* interpretation." *MPEP §2143.03*. (emphasis added). By asserting that gravity can "secure" the connecting rod of Nooutage to the collars of the pressurized fuel containers, the Examiner failed to give the word "secured"/"secures" of claims 8, 10, and 19 it's broadest *reasonable* interpretation.

As explained on page 17 of the Appeal Brief, a person having ordinary skill in the art would readily recognize that the term "secure" regarding a regulator mounting device to a pressurized fuel source means "to make fast." *See* "secure," *Merriam-Webster Dictionary*, 2021, https://www.merriam-webster.com/dictionary/secure (13 October 2021). Further, one skilled in the art would understand that the term "fast" means "firmly fixed" or "not easily freed." *See* "fast," *Merriam-Webster Dictionary*, 2021, https://www.merriam-webster.com/dictionary/fast (13 October 2021). Contrary to the Examiner's contention, a skilled artisan would not conclude that a mounting bar resting on collars by way of grooves in the bar to be "firmly fixed" to the collars or "not easily freed" because it is held by gravity. Rather, the fact that only gravity is holding the mounting bar in place shows that the mounting bar is clearly easy to remove from the

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collars. Accordingly, the Examiner's rejection of the claims based on a connecting rod resting on the collars in Nooutage failed to properly consider the terms "secured" and "secures" in judging the patentability of claims 8, 10, and 19, which call for a regulator mounting device secured to a pressurized fuel source or a regulator mounting device that secures to a collar of a pressurized fuel container. *See MPEP* §2143.03.

Also, the connecting rod of Nooutage is not secured to a collar of a pressurized fuel container as would be required to obviate claims 10 and 19, since the connecting rod would clearly fall off a collar of a single pressurized fuel container in Nooutage. Further, since Nooutage discloses the single primary pressure regulator positioned along a connecting rod straddling a pair of pressurized fuel containers (*See Nooutage*), Nooutage does not disclose primary and secondary pressure regulators positioned adjacent each other along an outer periphery of a collar, as called for in claims 10 and 19. Since Bassguitarist1985 does not disclose primary and secondary pressure regulators positioned along an outer periphery of a collar of a pressurized fuel container, the combination of Nooutage and Bassguitarist1985 does not teach or suggest each and every element of claims 10 and 19.

In light of at least the above, the Examiner did not establish a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to claim 8, 10, or 19. Neither Bassguitarist1985, nor Nooutage, nor a combination thereof teaches or suggests a regulator mounting device secured to a pressurized fuel source with a secondary pressure regulator mounted thereon, as called for in claims 8, 10, and 19. Accordingly, Appellant believes claims 8, 10, and 19 to be patentably distinct over a combination of Bassguitarist1985 and Nooutage, and thus requests reversal of the rejection of claims 8, 10, and 19, and the claims dependent therefrom.

CONCLUSION

For at least the reasons set forth above, that which is called for in claims 1-19 is not taught or suggested in the art of record or a combination thereof.

As such, Appellant believes that claims 1-19 are patentably distinct over the art of record.

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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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UNITED STATES
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	10/13/2021 05:14:59 PM ET	CET1090.074

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60353156	AUTHORIZED BY	Andrew Stark
CUSTOMER #	26629	FILING DATE	02/06/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Mark J. Sarder

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 4529	E20210CH16404418	Robyn Templin

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2413	FORWARDING AN APPEAL IN AN APPLICATION OR EX PARTE REEXAMINATION PROCEEDING TO THE BOARD	1180.00	1	1180.00
			TOTAL AMOUNT:	$1,180.00

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 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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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

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16/783,455	**10/13/2021 05:14:59 PM ET**	**CET1090.074**

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CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Andrew Stark

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2021.10.13 Reply Brief.pdf	20	Reply Brief Filed	204 KB

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2021.10.13 Reply Brief.pdf	7822AFB66ADBDEA7878086236B19750B36247519B9F623A8CA 9A309CEB75DA691F4D71FA91B882D387FA0DF050B0F57FBA8 2C2E0312FD34EB7845CE4DC535058

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Courtesy Reminder for
Application Serial No: 16/783,455

Attorney Docket No: CET1090.074
Customer Number: 26629
Date of Electronic Notification: 08/13/2021

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 08/13/2021

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EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
08/13/2021	ELECTRONIC

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Application Number: 16/783,455
Filing Date: 6 Feb 2020
Appellant(s): Sarder et al.

Andrew C. Stark, Jacob M. Fritz
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07/06/2021.

Attachments: PTO-892

RELATED APPEALS AND INTERFERENCES: Appellant's co-pending application 16/191,503 -- the subject of the Double Patenting rejection in the Final Rejection mailed 02/01/2021 – has an appeal brief filed on 01/27/2021 with an Examiner's Answer to Appeal Brief mailed on 06/29/2021. The outstanding matters in the co-pending application are similar to, though not exactly the same as, those of the current application.

(1) Grounds of Rejection to be Reviewed on Appeal

Every ground of rejection set forth in the Office action dated 02/01/2021 from which the appeal is taken is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

The following ground(s) of rejection are applicable to the appealed claims.

Claim Rejections - 35 USC § 102

1. 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.

2. 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)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

3. Claim(s) 1, 4, 7, 11, 14, 16, and 18 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaRQg).

4. **Regarding claims 1 and 11,** Bassguitarist1985 discloses a dual fuel generator and fuel delivery system (Title) comprising: a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line (Title and 16:48 to 18:10, lines allowing pressurized LPG into the tank are shown); a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent a quick-connect hose attachment for attachment to a fuel source), the fuel regulator system configured to: regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator (as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

5. **Regarding claims 4, 14, and 16,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 and as it pertains to claim 16, wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line (2:13, a EF2000iS Yamaha generator is shown, the EF2000iS being a gasoline generator and therefore operating via liquid fuel supplied via liquid fuel sources and lines)

6. **Regarding claims 7 and 18,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises

a secondary pressure regulator; and wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line ((as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

Claim Rejections - 35 USC § 103

7. 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.

8. 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.

9. Claim 2, 12, and 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985.

10. **Regarding claims 2, 12, and 17,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

11. However, dual stage regulators for gaseous fuel systems are old and well-known in the art sufficient for examiner to take official notice that it would have been obvious to one of ordinary skill in

the art before the filing date of the invention to include a dual stage regulator as either a combination of the included two regulators or in place of either of the regulators, as dual stage regulators are known devices that improve the efficiency and reliability of a pressure regulation system.

12. Claim 3, 8-10, 13, and 19 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm).

13. **Regarding claims 3, 8-10, 13, and 19,** Bassguitarist1985 discloses the generator and fuel delivery system of claims 2 and 7, but fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container.

14. Nooutage discloses a fuel system for a generator (first section, the object being an LP generator), wherein the fuel system includes liquid propane gas containers with a collar mounting bracket supporting a dual-stage regulator ("Hose connection to portable tanks", the image reproduced below).



15. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to move the regulators of Bassguitarist1985 to a collar mounting bracket as shown in Nooutage as it would constitute nothing more an applying a known technique of mounting a regulator in

a secure and easily accessible position being applied to a known and similar device – the dual fuel generator LPG fuel system – to yield predictable and known results. Further, the devices operation would not be impacted in any way, shape, or form and would function identically, the only difference being in the ease of usage of an operator and safety of the regulators (instead of dangling, they would be firmly mounted to the fuel sources). *Ruiz v. AB Chance Co.*, 357 F.3d 1270, 69 USPQ2d 1686 (Fed. Cir. 2004)

16. Claim 5 and 15 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al (US 2011/0168133).

17. **Regarding claim 5 and 15,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 4, but fails to disclose further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

18. Pursifull discloses an engine system operating on a liquid fuel and a gaseous fuel (¶ [0022], the gaseous fuel being a fuel such as propane), wherein the fuel systems are controlled via a three-way valve 120 (Fig. 1, shown), and wherein this valve actuates and controls which fuel reaches the engine 102 (¶ [0025]). This valve control allows further control of the fuel system and allows for fuel shut off to both systems if need be in order to allow for a reduction in emissions and improved engine operation (¶ [0004] and [0005]).

19. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to modify the bass device of Bassguitarist1985 with the ideas of Pursifull, wherein a mechanical valve may be installed up stream of a fuel rail (or in the case of Bassguitarist1985, a carburetor), in order to more precisely control fuel flow and reduce engine emissions.

Double Patenting

20. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission.

For more information about eTerminal Disclaimers, refer to

www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

21. Claims 1-19 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. **16/191,503** (reference application). Although the claims at issue are not identical, they are not patentably distinct from each other because the limitations contained within the instant application are identical to those of the reference application. The only difference in application scopes being the instant applications limitation of the generator being free from regulators, however the reference application does not disclose the generator including a regulator and instead specifically states that the regulators are located off-board from the generator.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Allowable Subject Matter

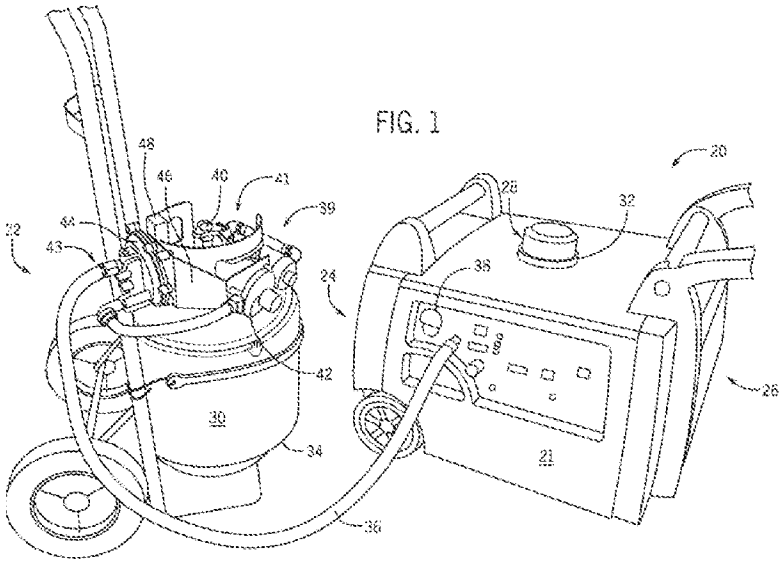
22. Claim 6 is would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if the double-patenting rejection above is overcome.

23. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art fails to disclose or make obvious a mechanical fuel valve that when actuated blocks the coupling of the fuel systems to the dual fuel generator from their fuel source.

(2) Response to Argument

24. **With regards to appellant's arguments, it would be important to note the *state of the art*.** This will be followed by a discussion on the rejection and its art and then address the arguments put forth by appellant. While appellant's disclosure shows a depiction of a generator connected to a propane tank in

Fig. 1, reproduced below, most of the prior art patents – not just of record, but as a generality – contain merely stylized depictions and diagrams for the sake of simplicity. Thus, it is important to make note of what these depictions are showing and what is known in the art: when a piece of art states a term such as "propane bottle" or "external fuel tank" those are likely, and implicitly, to mean devices such as a typical propane tank. When a dual fuel generator is mentioned, it is often one similar to Fig. 1 of appellant's disclosure.



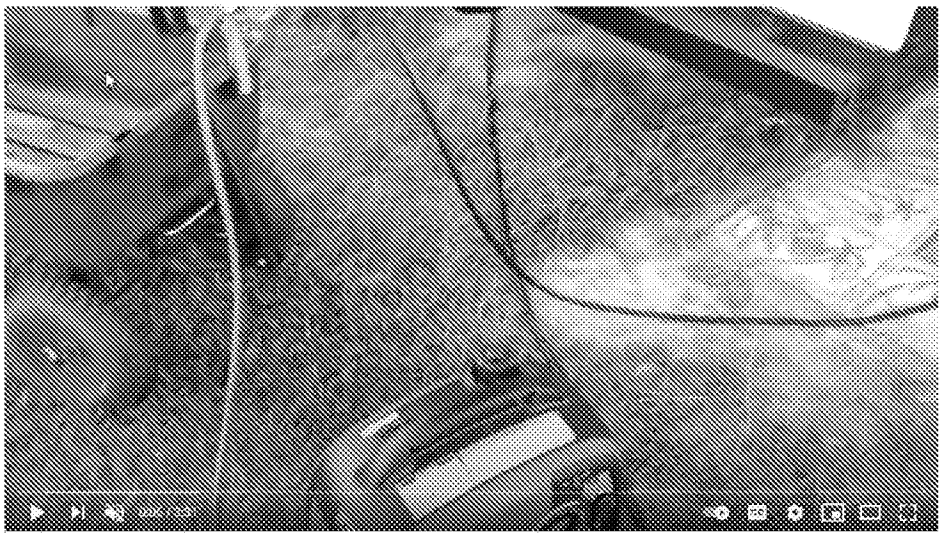
25. In this case, the key art being discussed is noted in appellant's disclosure to be "dual fuel generators, and more particularly, to an apparatus and method for delivering liquid fuel and gaseous fuel to a dual fuel generator" (¶ [0002] of the instant invention's disclosure).

26. Turning to the state of the art, we have devices such as:

a. A Champion Dual Fuel Generator shown on June 1st, 2014 with a selector switch at 0:19, gasoline fill at 1:07, a dual-stage regulator (i.e. two regulators in one) attached to a propane tank at 1:49, the setup being shown at 4:30 depicted below (Champion Power Equipment, "How-To: Dual Fuel Generator Start-Up," https://www.youtube.com/watch?v=CMW2nxPnWpE, Jun 1st, 2014).



b. Yamaha EF2000is is being modified to operate as a dual fuel engine with a propane connection and typical propane regulator system of two regulators in Webb (Chuck Webb, "Yamaha ef2000is is running on the propane quick connect pulling the Coleman air conditioner." https://www.youtube.com/watch?v=L6TB9nqbqtg, Sep. 24th, 2017).

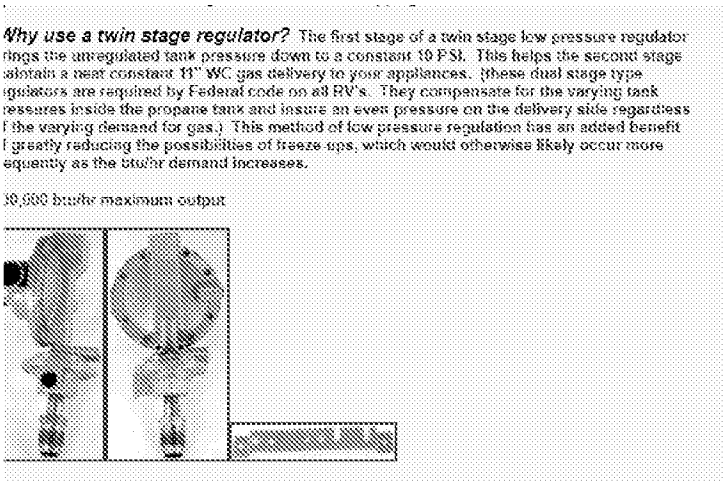


Note that the Yamaha EF2000is is known to be modified in this manner since at least 2014 as per Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri-Fuel Kit: Overview & Installation Tips," https://youtu.be/caZawwDaRQg, Jan. 3rd, 2014) use in the rejection above.

c. A Sportsman 7500 Dual Fuel Generator can be seen operating from a propane tank which has a regulator mounted on it in Bigredd110 (Bigredd110, "Sportsman 7500 Watt Dual Fuel Generator with Electric Start," https://www.youtube.com/watch?v=5RQRgUG8OeQ, Feb. 23rd, 2014).



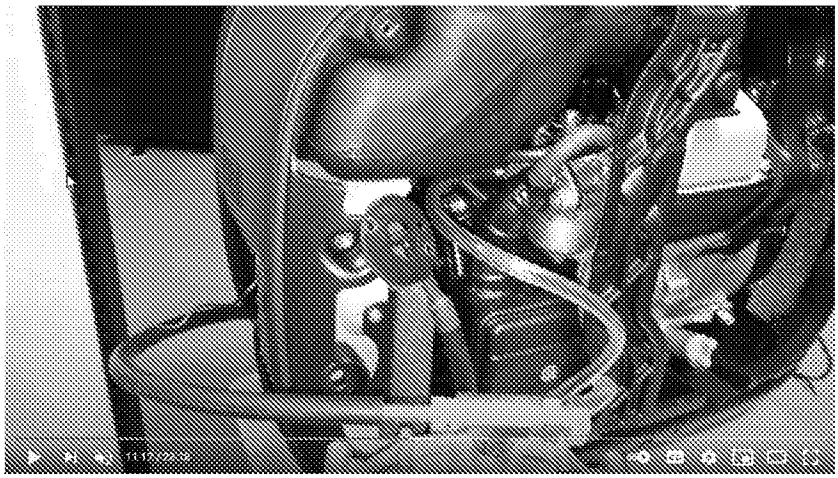
27. GasHoseandRegulators (GasHoseandRegulators, May 17th, 2014, https://web.archive.org/web/20140517093401/http://gashosesandregulators.com/), is an entire website which pertains to selling and supplying people with gas hoses and regulators for items such as generators making use of propane ("Gas hoses, gas regulators, gas appliance hose, generator connectors, custom length low pressure gas hose, and gas burners from Gas Hoses and Regulators . com"). Specifically Gashose discloses making use of various twin stage regulation devices to facilitate fuel from typical propane tanks (https://web.archive.org/web/20140927232814/http://gashosesandregulators.com/lowpressureregulators.html).



28. This is important for the future discussions to see exactly what one of ordinary skill in the art would have in mind when dealing with these devices and what they would know about them.

29. **A quick summation of the art used in the rejections will be noted following the above state of the art discussion.** The details of this art and their rejections is above. Below is just a quick reiteration of what exactly is in the rejections in light of the shown state of the art.

30. Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri-Fuel Kit: Overview & Installation Tips," https://youtu.be/caZawwDaRQg, Jan. 3rd, 2014) is a reference showing the modification of a Yamaha EF2000iS generator to be run on a gaseous fuel (e.g. Propane) as well as a liquid fuel (e.g. Gasoline)with a "US Carburation" kit. At 11:17 the generator is shown with a line from it to a fuel regulator which is currently located off-board the generator.

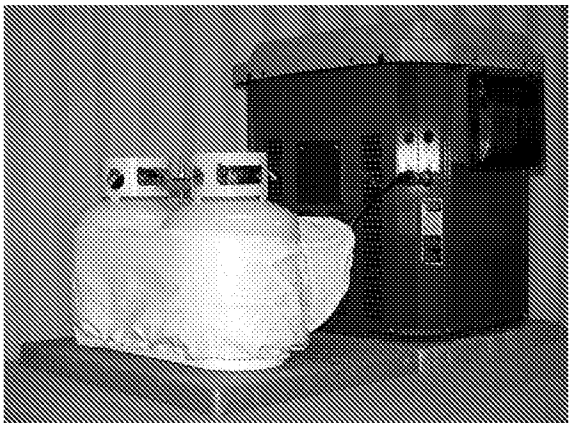


At 18:15 a second regulator is shown with a quick connect outlet for connection of the gaseous fuel line to a gaseous fuel tank.



It is noted at 10:05 by the user that the "demand regulator" is mounted on outside side of the generator that he has seen and he believes he may also attach it there. At 14:54 he notes he has seen the demand regulator also mounted on a back cover of the outside of the generator, but "there is no right or wrong way."

31. Nooutage.com (Nooutage.com, Aug. 27th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm) is an entire website dedicated to selling and supplying generators. As noted on its page, it includes "a propane quick connect kit." On its opening page it shows these tanks attached to a generator:



32. And shows a twin regulator mounted to the collar of a propane tank



33. Pursifull et al (US 2011/0168133) pertains to "a fuel system that provides versatility so that different fuel types can be injected for combustion, if desired" (¶ [0017]). The real crux of its disclosure is that of a method of operating a fuel system (Abstract), but it also happens to show the internals of a dual fuel system, in a diagram level view (Fig. 3), including the fuel switch valves (Fig. 3, tanks 112, 134 and valves 118, 120).

34. **Thus we can sum up these devices in series**: a dual fuel engine showing a switching valve between liquid and gaseous fuel, but only shows it at a diagram level; a dual fuel engine having a switching valve which shows external pressure regulation for a propane fuel source located off board the system; an online store selling pressure regulators, including twin stage regulators, specifically for

off board fuel tanks; and another store sells generators and shows how propane is often connected to the generators.

35. **The rejection in summary in light of this***: an engine generator is shown with a modification using two regulators to operate on gaseous fuel (Bassguitarist1985), wherein these regulators are then modified to be mounted upon the fuel source itself (Nooutage) that are included with their off-board fuel tanks and attached to them (Nooutage.com and Bassguitarist1985 having off-board fuel tanks). Then an additional mechanical fuel valve is added to allow a user to select which fuel source they will be making use of (Pursifull et al). These pieces of art are not singular in these ideas and as noted in the state of the art above, their combinations are well-established.*

36. **Arguments presented by appellant are summarized here and addressed in order below:**

While appellant acknowledges the existence of the Double Patenting rejection filed 02/01/2021, there are no arguments against it and so it will not be addressed in the below arguments.

a. With regards to Bassguitarist1985, appellant argues that it fails to teach that the primary and secondary regulator are located *off-board* the generator. Applicant notes they have defined "off-board" to mean "located remotely" as per ¶ [0025] ("in any case is *located remotely, or off-board, from dual fuel generator 20.")*. This argument is based upon Bassguitarist1985 disclosing their intention to Velcro the demand regulator to the exterior of the generator. Appellant also argues that any argument of Bassguitarist1985 being free of any regulator would be in relation to the EF2000iS generator before conversion and that the newly converted generator includes a regulator mounted on-board the generator.

i. Continuing on this argument, appellant argues that the disclosure discusses fabricating a simple sheet metal bracket underneath the machine and mounting the demand regulator via this as per the text description and audible narration.

ii. Appellant argues that Bassguitarist1985 shows the system in a disassembled state and therefore it is not shown or taught that the system can be operated as shown.

b. Appellant argues that Chuck Webb is not relevant prior art and further that is fails to disclose the relevant limitations of a dual stage regulations system.

c. Appellant further argues that Nooutage cannot be used to modify the system as it does not show a generator being used.

d. Appellant argues that Bassguitarist1985, with regards to claims 7 and 18, fails to disclose the quick connect hose claimed. Appellant assert that the "quick-connect hose coupling" is not "a line."

e. With regards to Nooutage as it modified Bassguitarist1985, Appellant argues that the bracket of Nooutage is not *SECURED* to the collars of the propane tanks.

37. **Each argument is addressed in order below:**

a. Firstly, it should be noted what the normal meaning of "off-board" is within the art. The definition of off-board is: "not carried, installed, etc., within a vehicle or electronic device" as per dictionary.com. Appellant's disclosure mentions it in ¶ [0025] as "in any case is located remotely, or off-board, from a dual fuel generator 20." Further, ¶ [0024], states "mounted off-board the generator to reduce size and cost of the generator." Thus, while Appellant gives no exact definitions, we can ascertain that what is *intended* is that of the normal definition: "the device is not carried or installed *within*" the generator.

Does Bassguitarist1985 fulfill this claim limitation? It absolutely does. Firstly, it should be noted that this is an *anticipation* rejection, not an *obviousness,* rejection. What is exactly shown in Bassguitarist1985? It shows a generator, a Yamaha EF2000iS, which is modified to operate upon gaseous fuel with a dual regulator system. The speaker states he intends to attach the "Demand regulator" to the exterior via a metal bracket, but also states "there is no right or wrong way" at 14:54. Thus the shown system can be operated as shown – making use of the shown quick connect lines -- and if it is *capable* of being operated as shown it immediately discloses the regulators being off-board as they are not even attached to the system at all.

But, for the sake of argument, it will be assumed that the regulator *must* be attached in some fashion; this is based on what is *taught* by the reference (no metal bracket is shown). In this case the regulator is still "off-board" as disclosed by user in the video. He is attempting to attach it via a metal bracket to the exterior of the generator (as discussed at length by appellant). He is not *placing the regulator within the generator*. Not only is he attaching it to the exterior, but he is attaching it *remotely* via a metal bracket, rather than fastening it directly to the generator. As transcribed by appellant, Bassguitarist1985 states, "[Get] a piece of sheet metal and you know throw some mounting screws on there and call it a day… so it's just going to be *hanging off the side of the machine."* This is, by-definition, "remote" and by-definition "off-board."

Thus, in both cases, the art discloses the claim limitation as it is presented.

b. Chuck Webb was merely exemplary art used to further describe examiner's position. It is noted that while it is after the filing date of the instant invention, the art shown is that of Bassguitarist1985 and it is shown operating without a regulator attached in any way to the generator. Appellant has made unsupported arguments that Bassguitarist1985 could not be operated as it shown, thus Chuck Webb is simply used to show that this device could be

operated as shown in an effort to make an argument with support rather than mere allegations. There is a clear distinction with regards to Chuck Webb, *the reference* is dated after the filing date**,** *but the art shown* is that from before the filing date (identical art of Bassguitarist1985). Chuck Webb is not material to the rejections, it is merely being used to show that allegations that it is impossible for the art of Bassguitarist1985 to function as it is shown are not supported by any actual factual backing.

c. Nooutage shows its system attached to a generator in two different pictures on the reference pages. These pictures are shown below.



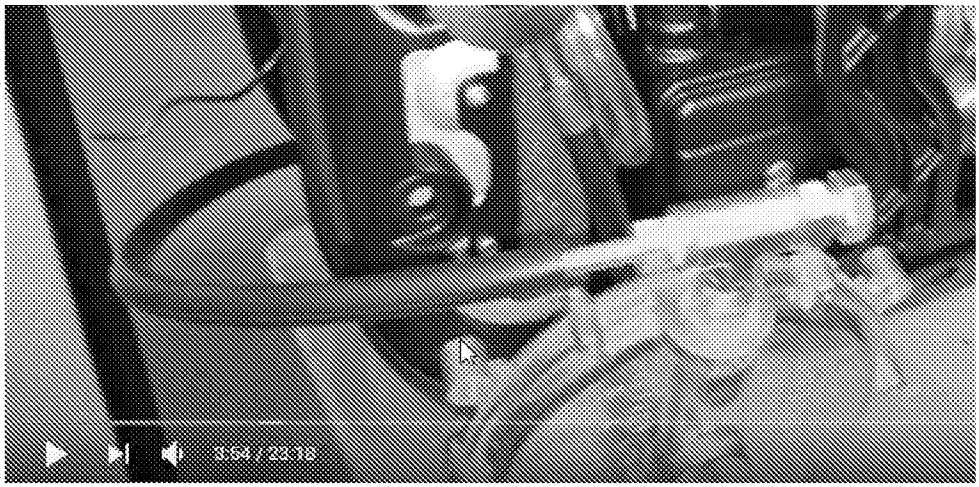
Notable in this photo is that a quick-connect hose couple can be seen on the side of the generator for the line from the fuel storage tanks.



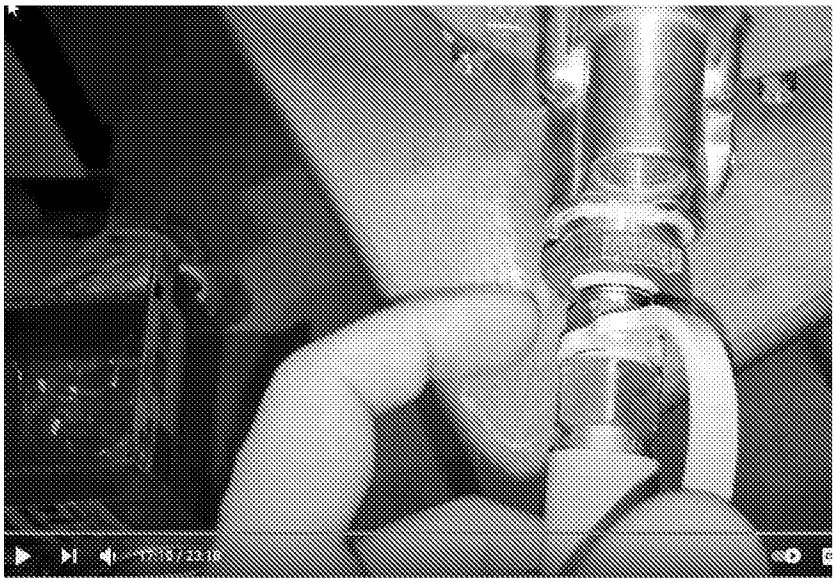
The modifications in light of Nooutage consider that it is connected to a generator system.

d. The claim limitation in question is: “further comprises a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.”

In Bassguitarist1985 16:48-18:10 a quick connect hose is shown leading from the first pressure regulator to “the secondary pressure regulator” and through this into the dual fuel generator. *The claim specifically states*, “a first end coupled an outlet of the secondary pressure regulator;” show below.



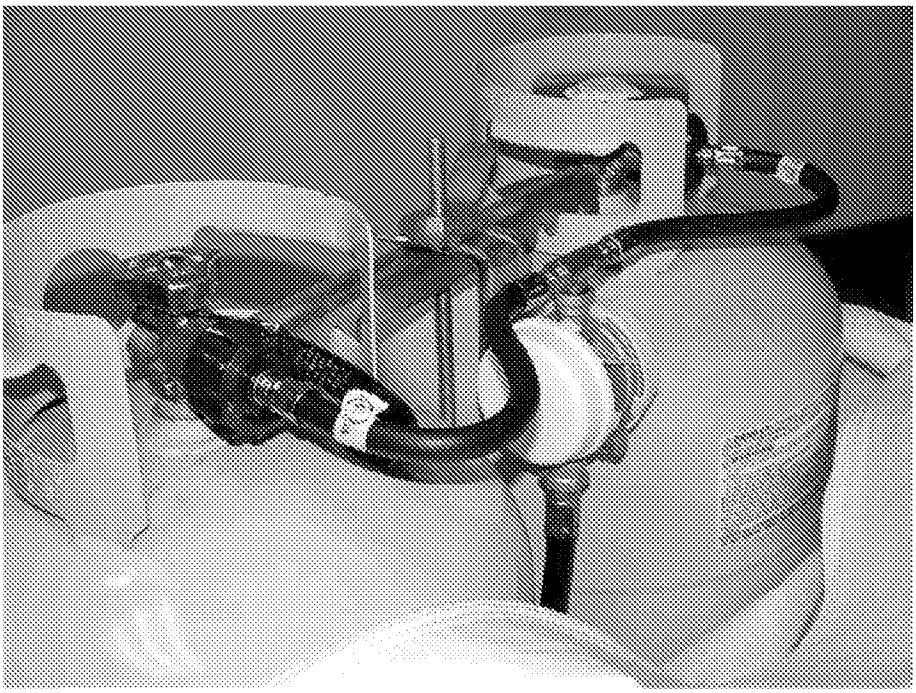
*The claim then specifically states, "*and a second end coupled to *an inlet of the gaseous fuel line to couple the secondary pressure fuel regulator to the gaseous fuel line."* As shown below.



There is no specification on which end, or if both ends, have the actual quick-connect couple. All that is claimed is that the quick connect hose coupling has one end on the generator and another end on "an inlet of the gaseous fuel line" and this performs the function of allowing the secondary pressure fuel regulator to be coupled to both sides. This is fulfilled by Bassguitarist1985 which shows one end attached to the generator and another end quick-

connected to the fuel inlet from the first regulator, this facilitates the flow through the second regulator.

e. Nooutage shows a dual fuel regulator secured to the collars of the propane tanks. There appears to be no other interpretation of the photo or the disclosure. The picture is replicated below.



The claim limitation being discussed is that of claim 8, "a regulator mounting device secured to the pressurized fuel source" and claim 10, "secures to the collar so that the primary and secondary pressure regulators are positioned adjacent each other."

The above photo shows a mounting bar which is *SECURED* to the collars by way of grooves in the bar held on by gravity. Appellant's claims never state *SECURED BY FASTENERS* or *SECURED BY WELDING.* The claim merely states secured. In this case the shown mounting structure clearly and easily secures the structures shown, there are no other interpretations of the photo. Despite allegations that "grooves merely rest on collars" not being secure, that would actually be quite secure due to the function of gravity of which they would be subjected.

Further, the shown lines from the two fuel tanks merge at a T-junction and then are fed into what appears to be a dual stage regulator.

Thus Nooutage teaches a mounting structure for regulators upon gaseous fuel tanks which is being used to modify the base device of Bassguitarist1985 such that Bassguitarist1985's regulators would and could be modified to be secured to the fuel source.

It is noted that the dual stage regulator shown is never explicitly stated to be a dual stage regulators (i.e. two regulators). However, such regulators are extremely common and well-known in the art to such a degree that even in the case these were not proven to be so, it would be trivial and obvious to make them such a type of regulators. The reference of GasHoseandRegulators above discusses regulators as it pertains to their sale.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/KEVIN A LATHERS/

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

/HEATHER C SHACKELFORD/
Primary Examiner

Requirement to pay appeal forwarding fee. In order to avoid dismissal of the instant appeal in any application or ex parte reexamination proceeding, 37 CFR 41.45 requires payment of an appeal forwarding fee within the time permitted by 37 CFR 41.45(a), unless appellant had timely paid the fee for filing a brief required by 37 CFR 41.20(b) in effect on March 18, 2013.

Notice of References Cited	Application/Control No. 16/783,455	Applicant(s)/Patent Under Reexamination Sarder et al.	
	Examiner KEVIN A LATHERS	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					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	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	Champion Power Equipment, "How-To: Dual Fuel Generator Start-Up," https://www.youtube.com/watch?v=CMW2nxPnWpE, Jun 1st, 2014 (Year: 2014)
*	V	Chuck Webb, "Yamaha ef2000is is running on the propane quick connect pulling the Coleman air conditioner." https://www.youtube.com/watch?v=L6TB9nqbqtg, Sep. 24th, 2017 (Year: 2017)
*	W	Bigredd110, "Sportsman 7500 Watt Dual Fuel Generator with Electric Start," https://www.youtube.com/watch?v=5RQRgUG8OeQ, Feb. 23rd, 2014 (Year: 2014)
*	X	GasHoseandRegulators, May 17th, 2014, https://web.archive.org/web/20140517093401/http://gashosesandregulators.com/ (Year: 2014)

*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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	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	07/21/2020	08/05/2021							
	1	✓	A							
	2	✓	A							
	3	✓	A							
	4	✓	A							
	5	✓	A							
	6	✓	A							
	7	✓	A							
	8	✓	A							
	9	✓	A							
	10	✓	A							
	11	✓	A							
	12	✓	A							
	13	✓	A							
	14	✓	A							
	15	✓	A							
	16	✓	A							
	17	✓	A							
	18	✓	A							
	19	✓	A							

Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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

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

37 CFR 1.8(a) **37 CFR 1.10**

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□ transmitted by facsimile to Fax No.: 571-273-8300 addressed to **Examiner Kevin A. Lathers** at the Patent and Trademark Office.

■ transmitted by EFS-WEB addressed to **Examiner Kevin A. Lathers** at the Patent and Trademark Office.

Date: July 6, 2021 /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 May 3, 2021.

1. REAL PARTY IN INTEREST

The real party in interest is Champion Power Equipment, Inc. by virtue of the Assignment recorded 02/06/2020, at reel 051837, frame 0599.

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 Power Equipment, Inc., 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

Claim 1 calls for a generator (20) and fuel delivery system (22) including a generator (20) free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source (34) through a gaseous fuel line (70), and a fuel regulator system (39) located off-board the generator (20) and comprising a first stage (42) and a second stage (44). *Specification*, ¶¶[0021]-[0025], [0038]; *FIGS.* 1 and 4A-5. The fuel regulator system (39) is configured to regulate the gaseous fuel supplied from the pressurized fuel source (34) in the first stage (42), the gaseous fuel regulated down to a reduced pressure in the first stage (42); and regulate the reduced pressure gaseous fuel in the second stage (44), the reduced pressure gaseous fuel from the first stage (42) regulated down to a desired pressure in the second stage (44) for delivery through the gaseous fuel line (70) to operate the generator (20). *Specification*, ¶¶[0023]-[0024], [0038]; *FIGS.* 1 and 4A-5.

Claim 11 calls for a generator (20) and fuel delivery system (22) including a generator (20) configured to operate on a gaseous fuel supplied from a pressurized fuel source (34) through a gaseous fuel line (70), and a fuel regulator system (39) located off-board the generator (20) and comprising a first stage (42) and a second stage (44). *Specification*, ¶¶[0021]-[0025], [0038]; *FIGS.* 1 and 4A-5. The fuel regulator system (39) is configured to regulate the gaseous fuel supplied from the pressurized fuel source

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(34) in the first stage (42), the gaseous fuel regulated down to a first reduced pressure in the first stage (42); and regulate the gaseous fuel output from the first stage (42) in the second stage (44), the first reduced pressure gaseous fuel from the first stage (42) being regulated down to a second reduced pressure in the second stage (44) for delivery through the gaseous fuel line (70) to operate the generator (20). *Specification*, ¶¶[0023]-[0024], [0038]; *FIGS.* 1 and 4A-5. The fuel regulator system (39) outputs gaseous fuel to the generator (20) for operation of the engine at the second reduced pressure. *Specification*, ¶[0024]; *FIG.* 1.

Claim 16 calls for, a dual fuel generator (20) and fuel delivery system (22) including a dual fuel generator (20) configured to operate on a liquid fuel supplied from a liquid fuel source (32) through a liquid fuel line (66) and a gaseous fuel supplied from a pressurized fuel source (34) through a gaseous fuel line (70), and a fuel regulator system (39) located off board the dual fuel generator (20). *Specification*, ¶¶[0021]-[0025], [0038]; *FIGS.* 1 and 4A-5. The fuel regulator system (39) includes a primary pressure regulator (42) coupled to a service valve (40) of the pressurized fuel source (34) and is configured to regulate the fuel supplied from the pressurized fuel source (34) to a first reduced pressure, and a secondary pressure regulator (44) coupled to the primary pressure regulator (42) and configured to regulate the gaseous fuel supplied from the primary pressure regulator (42) down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line (70) to operate the dual fuel generator (20). *Specification*, ¶¶[0023]-[0024], [0038]; *FIGS.* 1-4A-5. The fuel regulator system (39) outputs gaseous fuel to the dual fuel generator (20) for operation thereof at the second reduced pressure. *Specification*, ¶¶[0024]; *FIG.* 1.

4. ARGUMENTS

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985

Claims 1, 11, and 16

Introduction

The Examiner rejected independent claims 1, 11, and 16 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha

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EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaRQg). In rejecting the claims, the Examiner asserted (in part) that Bassguitarist1985 discloses "a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source… (Title and 16:48 to 18:10)" and "a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent a quick-connect hose attachment for attachment to a fuel source)." *Final Office Action*, 02/01/2021, pp. 2-3.

Appellant respectfully disagrees with the rejection and believes claims 1, 11, and 16 to be patentably distinct from that which is disclosed in Bassguitarist1985. That is, Bassguitarist1985 does not anticipate that which is called for in claims 1, 11, and 16, as anticipation under 35 U.S.C. §102 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 (Fed. Cir. 1989)). As will be set forth in detail here below, Bassguitarist1985 does not disclose each and every element of claim 1, 11, or 16 and thus does not anticipate the claims, 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)).

Summary of Bassguitarist1985

Bassguitarist1985 discloses a gasoline generator that is converted into a tri-fuel generator. *See Bassguitarist1985*, Title. As part of the conversion to enable the generator to use propane, a demand regulator is utilized. *Id.* The demand regulator may be mounted to the generator in a number of locations, such as by mounting the demand regulator outside the generator intake by drilling into the generator housing (*Id.* at 10:00, 11:40), by mounting the demand regulator on the back cover of the generator housing (*Id.*

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at 14:55), or by mounting the demand regulator to/on a foot of the generator using a bracket. *Id.* at 19:40.

More specifically, Bassguitarist1985 discloses that the generator is disassembled for installation of a tri-fuel conversion kit. *Id.* at 3:20. Bassguitarist1985 discloses that the tri-fuel conversion kit includes a motor snorkel that couples between the carburetor and air breather hose. *Id.* at 4:50. The motor snorkel includes a probe that provides fuel to the carburetor from a hose for incoming propane or natural gas. *Id.* at 4:50. Bassguitarist1985 discloses that the hose for incoming propane or natural gas can exit the generator through a hole drilled near the generator intake or through a hole drilled near the back cover. *Id.* at 9:45, 11:25, 14:05. A demand regulator mounts to the generator adjacent to the hose for incoming propane or natural gas, with an outlet of the demand regulator coupled to the hose. *Id.* at 9:45, 11:25. Specifically, the narrator of the Bassguitarist1985 video stated that "I've seen the demand regulator mounted outside…the intake," "getting back to where to mount this thing" (while pointing to the demand regulator), "I've seen guys actually mount the demand regulator right on the back of the back cover," and "circling back to how to mount that demand regulator." *Id.* at 9:55, 11:25, 14:45, 18:50. According to the narrator, the conversion process of the current generator includes mounting the demand regulator to/on a foot of the generator using a bracket, so as not to interfere with a generator cover used for storage. *Id.* at 19:40.

Bassguitarist1985 Fails to Teach the Claim Elements

Claims 1, 11, and 16 call for, in part, a generator configured to operate on a gaseous fuel through a gaseous fuel line and a fuel regulator system located off-board a generator and comprising a first stage and a second stage or a primary and a secondary pressure regulator. Bassguitarist1985, however, does **not** teach a fuel regulator system - comprising a first stage and a second stage or a primary and a secondary pressure regulator– that is located *off-board* the generator. As explained in paragraph [0025] of the Specification, the term "off-board" means "located remotely." Instead, in each of the mounting arrangements disclosed in Bassguitarist1985, the demand regulator is mounted

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on-board the generator – i.e., physically coupled/mounted directly to the generator – with the demand regulator mounted either directly adjacent the generator intake, on the back cover of the generator housing, or to/on a foot of the generator using a bracket. *Id.* at 10:00, 11:40, 14:55, 19:40. That is, the demand regulator mounts on-board the generator near the hose for incoming propane or natural gas that provides fuel to the motor snorkel. *Id.* at 11:25. Bassguitarist1985 discloses that the demand regulator mounts (1) adjacent the generator intake if the hose enters the generator though a hole drilled in a side of the generator above the intake, (2) on the back cover if the hose enters the generator through a hole drilled in the back of the generator at a lower end, and (3) to/on a foot of the generator using a bracket if the hose enters the generator through a hole drilled through the intake plate cover. *Id.* at 11:25, 13:00, 14:05, 19:40. Further, the narrator of the Bassguitarist1985 video makes many statements throughout the video clearly indicating that the demand regulator is mounted on-board the generator. *See id.*

Additionally, to the extent that Bassguitarist1985 teaches a generator "free of any pressure regulator," as asserted by the Examiner, Appellant notes that such a teaching is only provided in the context of the EF2000iS Yamaha generator as it is configured *before the conversion* thereof to a tri-fuel generator (i.e., when it is a gasoline only generator). In such a configuration, it is not a generator that is configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line as called for in claims 1, 11, and 16 – but instead is only configured to operate on gasoline. After conversion to a tri-fuel generator, the generator is then no longer "free of any pressure regulator," as instead, the generator then includes a demand regulator mounted *on-board* the generator, as explained in detail above. Thus, even where the generator in Bassguitarist1985 does not include a regulator, it cannot be considered a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line, as called for in claims 1, 11, and 16.

Bassguitarist1985 does not Support the Examiner's Position

In addition to the above, the Examiner's rejection of claims 1, 11, and 16 is deficient since the Examiner based the rejection on a single partial screenshot outside the

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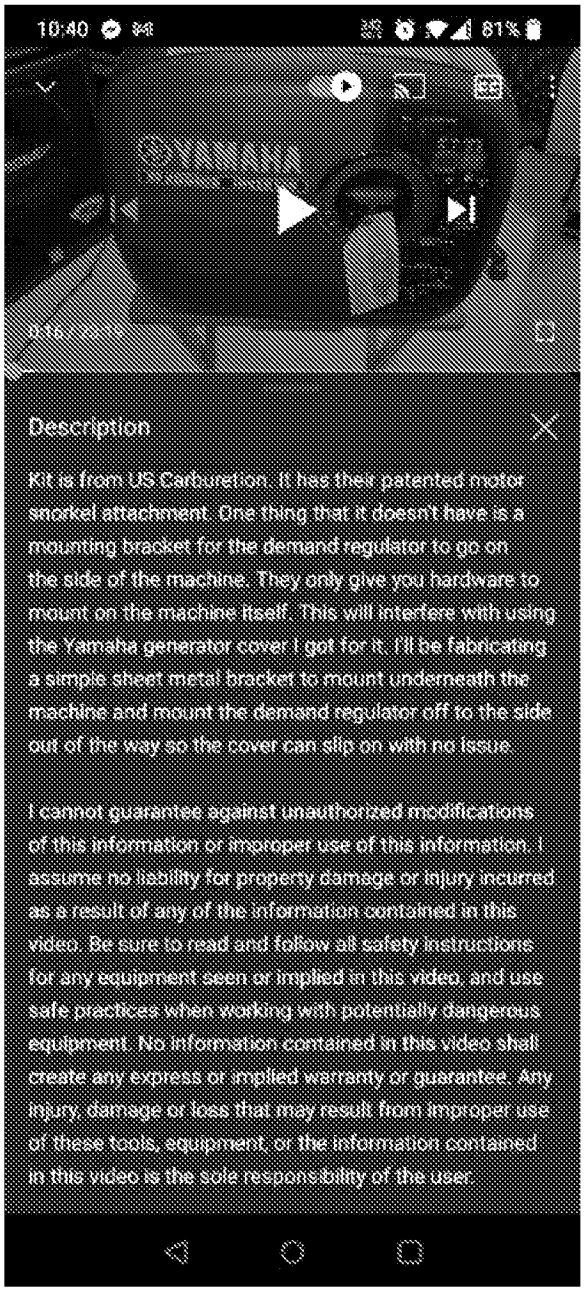
context of what Bassguitarist1985 teaches or suggests while ignoring images and narration throughout the entire 23 minute and 18 second Bassguitarist1985 video which clearly indicates the demand regulator is mounted only on-board the generator. *See Final Office Action*, pp. 2-3. That is, "*all* of the relevant teachings of the cited references must be considered in determining what they fairly teach to one having ordinary skill in the art." *In re Mercier*, 515 F.2d 1161, 1165 (CCPA 1975) (emphasis in original). "The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also those teachings which would lead such a person away from the claimed invention." *Id.* at 1166. "It is impermissible… to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448 (Fed. Cir. 1986). Full appreciation of a statement in a reference requires consideration of the context in which the statement was made. *Id.* An examiner must view a reference in its entirety and cannot ignore portions of a reference that argue against unpatentability. *See id.*

Here, the Examiner failed to consider video images of Bassguitarist1985 necessary for the full appreciation of what Bassguitarist1985 fairly suggests to one of ordinary skill in the art. That is, the Examiner produced a single partial screenshot of Bassguitarist1985 associated with its listing on the form PTO-892 attached to the Office Action mailed July 27, 2020. In the context of a social media source like the Bassguitarist1985 YouTube video that cannot be downloaded as an electronic document, the MPEP sets forth that "[w]here an Internet source, such as a social media source, does not provide an ability to download the information as an electronic document, screen shots should be captured of the information, and an explanation provided as to what can be found in the screen shots." *MPEP §707.05(e)(IV)*. In this case, the Examiner failed to provide screenshots from each of the time periods of the Bassguitarist1985 video relied upon by the Examiner in the rejection of claims 1, 11, and 16. That is, the Examiner's single partial screenshot appears to have a time stamp of 16:06, but the Examiner failed

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to provide a screenshot from other time periods relied upon in the rejections including 2:13 (*See Final Office Action*, p. 2), 16:48-18:10 (*See Final Office Action*, pp. 2-3), 9:57 (*See Final Office Action*, p. 8), and 9:59 (*See Advisory Action*, 04/16/2021, p. 2).

Further, the Examiner's partial screenshot fails to include portions of the screen necessary for the full appreciation of what Bassguitarist1985 fairly suggests to one of ordinary skill in the art. That is, the Examiner failed to provide the following written description associated with the Bassguitarist1985 screen:



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Bassguitarist1985. The written description clearly says, "I'll be fabricating a simple sheet metal bracket to mount underneath the machine and mount the demand regulator." *Description*, *Id*. Thus, Bassguitarist1985 is clearly directed to mounting the demand regulator to the generator for tri fuel conversion, and the Examiner improperly failed to consider this teaching. *See Bausch*, 796 F.2d at 448.

Further, the Examiner improperly failed to consider the audible narration of Bassguitarist1985, necessary for the full appreciation of what Bassguitarist1985 fairly suggests to one of ordinary skill in the art. While Appellant has no obligation to reproduce a transcript from the Examiner's reference, Bassguitarist1985 discloses only three positions for the demand regulator upon conversion to tri fuel, which is summarized in the following partial transcription:

> Ok, and circling back to how to mount that demand regulator. Again, I've seen the pictures from U.S. Carb. They expect you that you're going to mount it over here off of these off the same um piece here and then it would basically be standing off ah these grill fins here so it doesn't ah block any of the airflow. Ah, but again it doesn't work well with the ah with the cover here. And, the other ah thing that I've said that is probably easier to do is to go and put it on the side. But, then again you don't want to have to go and spend you know another $45 for the blue panel. So instead, uh, and I've seen other, ah, another kit that is for this generator and also for the HondaEU2009. They actually have a bracket that ah mounts to the to the foot on the bottom here underneath, and it, then the demand regulator, the bracket comes out here, and then the demand regulator sits on top of it and it's mounted right on the side instead, again allowing the ability to put the cover on it. Simple as that. And I think that's the way that I'm going to go, but they don't sell that bracket separately. You'd have to buy their kit and they're not really happy that if you go to buy someone else's conversion kit, and you don't, you just want to buy their bracket, they won't do that. But it doesn't seem to be that hard, I think I've got enough ah mechanical inclination to just, ah, make, ah, get a piece of sheet metal and you know throw some mounting screws on there and call it a day. Ah, it doesn't need to be gorilla tight anyway, it's just going to be hanging off the side of the machine. So, this is going to conclude my video on ah just some of the issues that I've run into in converting this to tri-fuel.

See Bassguitarist1985, 18:49-20:30. Thus, Bassguitarist1985 discusses the only three options for locating the demand regulator upon conversion to tri fuel: (1) mounting the demand regulator outside the generator intake by drilling into the generator housing, (2)

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mounting the demand regulator on the back cover of the generator housing, or (3) mounting the demand regulator to/on a foot of the generator using a bracket. *Id.*; *see id.* 10:00, 11:40, 14:55, 19:40.

In the Response to Arguments section of the Final Office Action, the Examiner asserted that "as shown at 9:57, the demand regulator is shown sitting on the table before the user describes possibly fixing it to the generator. The regulator shown is fluidly connected and the generator would be operable at this time." *Final Office Action*, pp. 8-9. The Examiner stated in the Advisory Action that "[a]t 9:59 the 'demand regulator' (typically a second stage of a regulation system) is shown adjacent the generator. The fact that the user discusses where he would possibly attach it is irrelevant. The regulator is shown in a way that would allow for functionality and thus anticipates the limitation." *Advisory Action*, p. 2. Regarding the Examiners statements, however, the generator is actually shown in a disassembled state without the snorkel coupled to the carburetor to provide propane or natural gas to the engine from the demand regulator. *See Bassguitarist1985*, 9:57. Thus, the demand regulator is not fluidically connected and the generator would not be operable. To conclude that the generator of Bassguitarist1985 is configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims 1, 11, and 16, is to distort the teachings therein and is not supported by the disclosure of Bassguitarist1985.

Examiner Improperly Relied on Multiple References

Further, while it may appear that rejections of claims 1, 11, and 16 under 35 U.S.C. §102 is based on the Bassguitarist1985 video, the Examiner improperly relied on a second YouTube video in support of the rejections thereof. That is, in the Response to Arguments section of the Final Office Action, the Examiner referenced "Chuck Webb (Chuck Webb, https://youtu.be/L6TB9nqbqtg, 'Yamaha ef200is running on the propane quick connect pulling the Coleman air condition')" and asserted that "Chuck Webb is

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shown at 0:00 with an identical Yamaha generator having an on demand regulator mounted to a wagon nearby separate from the generator." *Final Office Action*, p. 9.

Initially, while the Examiner asserted that Chuck Webb discloses an "on demand regulator," Chuck Webb does not disclose a fuel regulator system comprising both a first stage and a second stage. *See Chuck Webb*, 3:10. Moreover, Chuck Webb is not available as prior art to the present application. The present application was filed on February 6, 2020, but is a continuation of, and claims priority to, U.S. Patent Application Serial No. 16/191,503, filed on November 15, 2018, which is a continuation of, and claims priority to, U.S. Patent Application Serial No. 14/738,060, filed on June 12, 2015. Accordingly, the effective filing date for the present application is June 12, 2015. Chuck Webb provides a publication date of September 24, 2017 and thus does not antedate the present application which has an earlier effective filing date of June 12, 2015. Thus, Chuck Webb is not prior art to the claimed invention and is not relevant to support a rejection under 35 U.S.C. §102(a)(1) with respect to the present application. *See 35 U.S.C. §102*.

However, in the Advisory Action, the Examiner presented the following argument:

> Applicant argues that Chuck Webb is irrelevant as it is not part of the substantive rejection. This is a mischaracterization of the purpose of Chuck Webb. The rejection is not over BassGuitarist1985's words or his specific video, the rejection is over *the device which is being shown* regardless of *who* is showing it. In this case, BassGuitarist1985 is explaining *the same device* as that shown in Chuck Webb. The point of Chuck Webb is to elaborate upon the reference of BassGuitarist1985, to show proof that the *same device* of BassGuitarist1985 is capable of, and been used by someone, operating as an off-board regulator. The rejection is with regards to the modified Yamaha generator shown in both references, it is not contained to what the user in BassGuitarist1985 manages to show or say in their video. Thus the device shown in BassGuitarist1985 anticipates the claims as per the further showing of the same device in Chuck Webb.

Advisory Action, pp. 2-3. (emphasis original).

Initially, since Chuck Webb was not part of the substantive rejection of claim 1, 11, or 16 under 35 U.S.C. §102(a)(1), but the Examiner relied upon the disclosure of Chuck Webb to support the rejections thereof, the Examiner failed to clearly articulate

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the rejections as required by MPEP §706. *Final Office* Action, pp. 2-3, p. 9; *Advisory Action*, p. 2-3. Further, contrary to the Examiner's statements, the standard for anticipation is not whether references that do not qualify as prior art show that an earlier claimed invention could work. *See Final Office Action*, p. 9; Advisory *Action*, p. 2-3. Instead, "[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.*, 814 F.2dat 631). Thus, regardless of whether Chuck Webb "show[s] proof that the *same device* of BassGuitarist1985 is capable of, and been used by someone, operating as an off-board regulator" *(Advisory Action*, p. 3 (emphasis original)), Chuck Webb is not relevant in supporting a rejection under 35 U.S.C. §102(a)(1) as being anticipated by a single prior art reference to BassGuitarist1985. *See MPEP §2131 (citing Verdegaal Bros.*, 814 F.2d at 631).

Not only is Chuck Webb not prior art to the claimed invention, but the Examiner admitted that the rejection "is not contained to what the user in BassGuitarist1985 manages to show or say in their video." *Advisory Action*, p. 3. Thus, since the Examiner admitted that the rejection is not based on the disclosure of Bassguitarist1895 alone, the rejection of claims 1, 11, and 16 as being anticipated by Bassguitarist1985 under 35 U.S.C. §102 is improper and must be reversed. In light of the above, the Examiner has not shown that Bassguitarist1985 discloses a fuel regulator system - comprising a first stage and a second stage (claims 1 & 11) or a primary pressure regulator and a secondary pressure regulator (claim 16) – that is located *off-board* the generator, as called for in claims 1, 11, and 16.

Furthermore, in discussing claims 1, 11, and 16 in the Response to Argument section of the Final Office Action, the Examiner also improperly relied upon another reference, Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm), which the Examiner previously cited only in the rejections of dependent claims 3, 8-10, 13, and 19. *Final Office Action*, p.10. The Examiner argued that, "even if the generator inherently necessitated the regulator's attachment in the configuration as shown,... Nouutage [*sic*]... discloses a modification in which a dual stage regulator is used and

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attached to the gaseous fuel storage tanks themselves," which "would cause the regulator to be considered off-board as it would move both regulators into attachment with the fuel storage devices. *Id.* However, the Examiner noted that this reference to Nooutage was "for the sake of argument" and acknowledged in the Advisory Action that "NoOutage is not part of the rejection, not [*sic*] does it need to be as it was simply a side discussion for the sake of shortening prosecution." *Advisory Action*, p. 3. Initially, since the Examiner relied on Nooutage "for the sake of argument" and "as a side discussion," the Examiner's application of Nooutage to the rejections of claims 1, 11, and 16 has no place in a rejection under 35 U.S.C. §102, which requires anticipation by a single prior art reference. *See MPEP §2131 (citing Verdegaal Bros.*, 814 F.2d at 631). As such, the Examiner's reference to Nooutage is improper and cannot be considered with respect to the rejection of claim 1, 11, or 16 under 35 U.S.C. §102(a)(1).

Further, even assuming *arguendo* that the Examiner's "side discussion" could be considered with respect to the rejections of claims 1, 11, and 16, the Examiner's image from Nooutage, which is reproduced in the rejection of dependent claims 3, 8-10, 13, and 19, does not show a generator and thus does not show a generator free of any pressure regulator. *See Final Office Action*, p. 5. Further, as explained in more detail below regarding claims 8, 10 and 19, Nooutage teaches (as best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers. *See Nooutage*. As a result, Nooutage does not make up for the deficiencies of Bassguitarist1985 since Nooutage does not disclose a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line with a fuel regulator system having first and second stages or primary and secondary pressure regulators located off-board the generator, as called for in claims 1, 11, and 16.

Conclusion

In light of at least the above, Bassguitarist1985 does not anticipate that which is called for in claim 1, 11, or 16, as anticipation under 35 U.S.C. §102 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*, 868 F.2d at 1236). Furthermore, the

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Examiner's reliance on Chuck Webb and Nooutage are improper in the rejection under 35 U.S.C. §102(a)(1). Appellant therefore believes that each of claims 1, 11, and 16 is patentably distinct from Bassguitarist1985 and respectfully requests reversal of the rejection of claims 1, 11, and 16 and the claims dependent therefrom.

Claims 7 and 18

The Examiner rejected dependent claims 7 and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985. In support of the rejections the Examiner alleged the following:

> Bassguitarist1985 discloses…a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line ((as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

Final Office Action, p. 3. In the Advisory Action, the Examiner contended the following:

> Claims 7 and 18 never state where in the lines the quick-connect portion of the quick-connect hose couple is included, simply that the quick-connect hose coupling as a hole includes: a first end couple to an outlet of the secondary pressure regulator (shown in BassGuitarist1985 and including the specific quick-connection point); a second end couple to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line (a line is shown from the regulator into the engine as is necessary for functionality and wherein these parts may be considered the other end of the quick connect coupling).

Advisory Action, p. 3. Appellant respectfully disagrees with the rejection of claims 7 and 18.

Claims 7 and 18 call for, in part, a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator, and a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator.

Despite the Examiner's contention that "[c]laims 7 and 18 never state where in the lines the quick-connect portion of the quick-connect hose couple is included" (*Advisory Action*, p. 3), claims 7 and 18 call for a quick-connect hose coupling positioned

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between an outlet of a secondary pressure regulator and an inlet of a gaseous fuel line. In contrast, Bassguitarist1985 discloses a quick disconnect coupled to an *inlet* of a demand regulator, rather than the *outlet* of the demand regulator. *Bassguitarist1985*, 16:45. Further, claims 7 and 18 call for an arrangement having the primary pressure regulator located upstream from the secondary pressure regulator. Thus, a quick connect between the Examiner's asserted "first regulator" and "second regulator" of Bassguitarist1985 does not teach a quick-connect hose coupling including a first end coupled to an *outlet* of a secondary pressure regulator.

While the Examiner asserted that "a line is shown [in Bassguitarist1985] from the regulator into the engine as is necessary for functionality and wherein these parts may be considered the other end of the quick connect coupling," *(Advisory Action*, p. 3), claim 7 and 18 make clear that a quick-connect hose coupling is not simply "a line" as evident by the claims separately calling for a quick-connect hose coupling and a gaseous fuel line. As such, Bassguitarist1985 does not disclose a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator and a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator, as called for in claims 7 and 18.

Further, the Examiner failed to provide screenshots from the 16:48-18:10 time periods of the Bassguitarist1985 video relied upon by the Examiner in the rejection of claims 7 and 18. As explained above in more detail with respect to claims 1, 11, and 16, the MPEP sets forth that "[w]here an Internet source, such as a social media source, does not provide an ability to download the information as an electronic document, screen shots should be captured of the information, and an explanation provided as to what can be found in the screen shots." *MPEP §707.05(e)(IV)*. However, the Examiners single partial screenshot appears to have a time stamp of 16:06 and does not show both a primary and secondary pressure regulator. *Bassguitarist1985*, 16:06. Since the Examiner failed to provide a screenshot from time periods 16:48-18:10 relied upon in the rejection of claims 7 and 18, the Examiner failed to clearly articulate the rejection thereof, as required by MPEP §706.

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Accordingly, Bassguitarist1985 does not teach or suggest each and every element of claims 7 or 18, and the Examiner failed to clearly articulate the rejection thereof under MPEP §706. Accordingly, Appellant believes claims 7 and 18 are patentably distinct from Bassguitarist1985 and respectfully requests reversal of the rejection of claims 7 and 18, and the claims depending therefrom.

Rejection under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Nooutage

Claims 8, 10 and 19

The Examiner rejected dependent claims 8, 10 (which depends from claim 8 via intervening claim 9), and 19 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Nooutage. In support of the rejection, the Examiner admitted that "Bassguitarist1985… fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container." *Final Office Action*, p. 5. Therefore, the Examiner alleged, "Nooutage discloses a fuel system for a generator…, wherein the fuel system includes liquid propane gas containers with a collar mounting bracket supporting a dual-stage regulator ("Hose connection to portable tanks",…)." *Id.* The Examiner asserted that "it would have been obvious… to move the regulators of Bassguitarist1985 to a collar mounting bracket as shown in Nooutage." *Id.* Appellant respectfully disagrees with the rejection of claims 8, 10 and 19.

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 one skilled in the art would not have been prompted to combine Bassguitarist1985 and Nooutage in the manner proposed by the Examiner. Furthermore, neither Bassguitarist1985 and Nooutage, nor a combination thereof, teaches or suggests the invention called for in claim

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8, 10, or 19. Accordingly, the Examiner has not established a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to claims 8, 10 or 19.

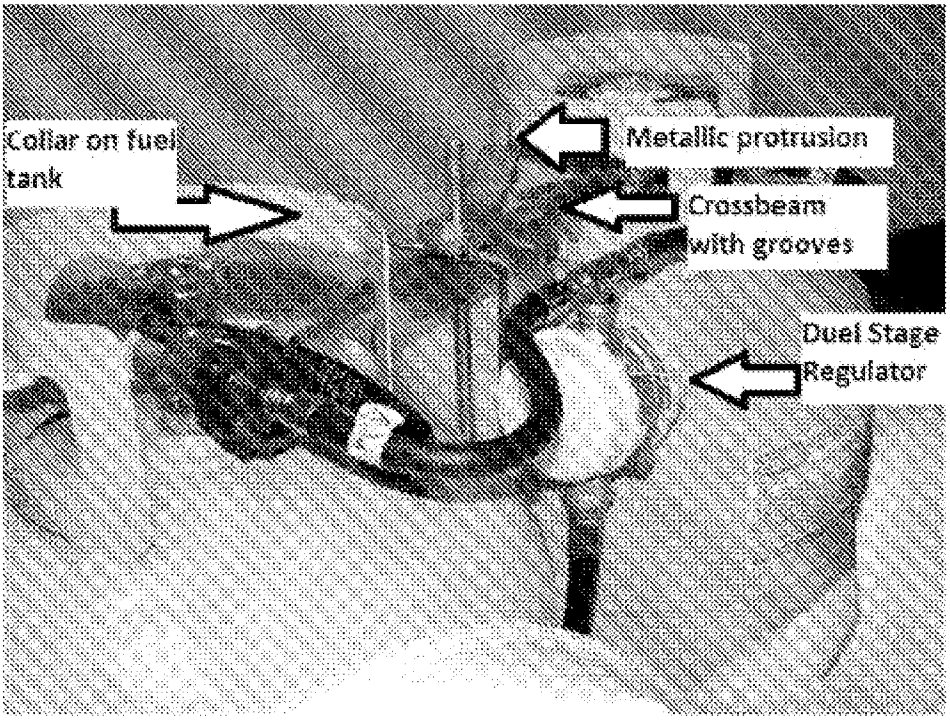
Claim 8 calls for, in part, a generator and fuel delivery system having a gaseous fuel from a first stage regulated down to a desired pressure in a second stage (by dependency on claim 1 via intervening claim 7), the first stage comprising a primary pressure regulator and the second stage comprising a secondary pressure regulator (by dependency on claim 7), and a regulator mounting device secured to a pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

Claims 10 and 19 call for, in part, a generator and fuel delivery system wherein a pressurized fuel source includes a pressurized fuel container having a collar, and wherein a regulator mounting device secures to the collar so that primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.

The Examiner has provided no indication of any prior art that suggests an arrangement as called for in claims 8, 10 and 19 where a regulator mounting device is secured to a pressurized fuel source with at least a secondary pressure regulator mounted on the regulator mounting device. Initially, the Examiner admitted that Bassguitarist1985 "fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container." *Final Office Action*, p. 5. Additionally, Nooutage fails to teach the arrangement called for in claims 8, 10 and 19 – as instead Nooutage teaches (at best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers and that is attached to the containers via a connecting rod extending between the collars. *See Nooutage*. The Examiner's position on page 5 of the Final Office Action that the single primary pressure regulator shown between the collars is "a dual-stage regulator" is unsupported since Nooutage has not been shown to describe the single primary pressure regulator as a dual-stage regulator. Further, Nooutage does not disclose that a regulator mounting device secures to a pressurized fuel source since the connecting rod disclosed by Nooutage simply rests on the pair of pressurized fuel containers to hold the single primary pressure regulator therebetween. The Examiner's argument in the Advisory

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Action that a "metallic protrusion from a central bolt… appears to interfere with the collar" (*Advisory Action*, p. 4) is not supported by Nooutage, as instead the "metallic protrusion" appears to be a wingnut that would not tighten on the central bolt if it interfered with the collars, as shown below in the Examiner's annotated image of Nooutage from page 4 of the Advisory Action.



Examiner Annotated Image of Nooutage

Further, MPEP §2111 states that "the meaning given to a claim term must be consistent with the ordinary and customary meaning of the term (unless the term has been given a special definition in the specification), and must be consistent with the use of the claim term in the specification and drawings… [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. Cir. 1999)). In the present case, a skilled artisan would readily recognize that the term "secure" regarding a regulator mounting device to a pressurized fuel source means "to make fast."[1] This plain meaning is consistent with the use of the term "secure" as

[1] https://www.merriam-webster.com/dictionary/secure

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disclosed in the Specification which discloses that "[r]egulator mounting bracket 46 has securing mechanism 48 to secure to collar 136" of pressurized fuel container 34 to "hold regulator mounting bracket 46 to collar 136". *Specification*, ¶[0047]. When given the "secure" limitation its proper broadest reasonable interpretation consistent with the requirements of MPEP §2111, it is clear that Nooutage fails to teach or suggest that a regulator mounting device is secured to a pressurized fuel source. That is, while the Examiner contended that the pressure regulator is "secured in place via the grooves" of a crossbeam (*Id.* – emphasis original), the grooves merely rest on collars of the fuel containers and thus do not secure the pressure regulator thereto. *Nooutage*.

In light of at least the above, the Examiner did not establish a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to claim 8, 10, or 19. Neither Bassguitarist1985, nor Nooutage, nor a combination thereof teaches or suggests a regulator mounting device secured to a pressurized fuel source with a secondary pressure regulator mounted thereon, as called for in claims 8, 10, and 19. Accordingly, Appellant believes claims 8, 10, and 19 to be patentably distinct over a combination of Bassguitarist1985 and Nooutage, and thus requests reversal of the rejection of claims 8, 10, and 19, and the claims dependent therefrom.

Double Patenting Rejection

Claims 1-19

The Examiner provisionally rejected claims 1-19 on the ground of non-statutory double patenting as being unpatentable over claims 1-17, 21, and 22 of co-pending Application No. 16/191,503.

Appellant notes that the double patenting rejection is not the only remaining rejection in the present application. The Examiner has also applied rejections under 35 U.S.C. §102(a)(1) and 35 U.S.C. §103 in the Final Office Action. Appellant, therefore, has previously requested that the double patenting rejection be held in abeyance by the Examiner pending resolution of the other rejections.

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5. CONCLUSION

For at least the reasons set forth above, that which is called for in claims 1-19 is not taught or suggested in the art of record or a combination thereof.

As such, Appellant believes that claims 1-19 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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CLAIMS APPENDIX

1. (Original) A generator and fuel delivery system comprising:

a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and

regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

2. (Original) The generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

3. (Original) The generator and fuel delivery system of claim 2 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

4. (Original) The generator and fuel delivery system of claim 1 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

5. (Original) The generator and fuel delivery system of claim 4 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel

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source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

6. (Original) The generator and fuel delivery system of claim 5 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve;

wherein, when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator; and

wherein, when the mechanical fuel valve is in the second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

7. (Original) The generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and

wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

8. (Original) The generator and fuel delivery system of claim 7, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

9. (Original) The generator and fuel delivery system of claim 8, wherein the primary pressure regulator is mounted on the regulator mounting device.

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10. (Original) The generator and fuel delivery system of claim 9, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

11. (Original) A generator and fuel delivery system comprising:

a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage; and

regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator;

wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.

12. (Original) The generator and fuel delivery system of claim 11 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. (Original) The generator and fuel delivery system of claim 12 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

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14. (Original) The generator and fuel delivery system of claim 11 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

15. (Original) The generator and fuel delivery system of claim 14 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

16. (Original) A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

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

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator;

wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.

17. (Original) The dual fuel generator and fuel delivery system of claim 16 wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

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18. (Original) The dual fuel generator and fuel delivery system of claim 16, further comprising a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

19. (Previously Presented) The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

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EVIDENCE APPENDIX:

-- None --

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RELATED PROCEEDINGS APPENDIX:

-- None --

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**07/06/2021 04:02:12 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60233487	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Andrew Stark

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2021.07.06 Appeal Brief.pdf	27	Appeal Brief Filed	362 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2021.07.06 Appeal Brief.pdf	27189EEFF094A4E9CC4F15985819AFB8C8822670A2FD2D0C700BFBB682841B70EBDBCE461A941EA4907448825040D5CE19E0027121ADAAE43DF92E85EBA7B70B

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If a new application is being filed and the application includes the necessary components for 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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NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD

Docket Number (Optional)
CET1090.074

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 May 3, 2021

Signature /Robyn L. Templin/

Typed or printed name Robyn L. Templin

In re Application of
Sarder et al.

Application Number	Filed
16/783,455	2/6/2020

For OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Art Unit	Examiner
3747	Kevin A. Lathers

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)) $ 840.00

[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: $ 420.00

[ ] 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 65742

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

Signature /Andrew C. Stark/

Typed or printed name Andrew C. Stark

Telephone number (262) 268-8100

Date May 3, 2021

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.

UNITED STATES
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P.O. Box 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	05/03/2021 10:29:36 AM ET	CET1090.074

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60187087	AUTHORIZED BY	Andrew Stark
CUSTOMER #	26629	FILING DATE	02/06/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Mark J. Sarder

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 4529	E202153A31140500	Robyn Templin

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2401	NOTICE OF APPEAL	420.00	1	420.00
			TOTAL AMOUNT:	$420.00

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 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

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**05/03/2021 10:29:36 AM ET**	**CET1090.074**

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OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

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PATENT CENTER #	60187087	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Andrew Stark

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2021.05.03 Notice of Appeal.pdf	1	Notice of Appeal Filed	108 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2021.05.03 Notice of Appeal.pdf	6343A5FD8C8AC7704E45E0E158184B2E826F771ECC1BAF399 2AA7B7F7999C33BDF2462654D379F5EFA9E012036273D63B65 E1AD305CA5C9386AFE945816AC302

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 04/16/2021

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

EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
04/16/2021	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
jmf@zpspatents.com

Response to Arguments

Applicant argues:

1. Bassguitarist1985 fails to disclose a fuel regulator system located off-board the generator, instead disclosing arrangements in which the regulator is mounted on-board the generator through various means and/or locations. Therefore it fails to disclose a generator "free of any pressure regulator" as after conversion the regulator would be mounted on the generator.

2. Applicant argues that Chuck Webb disclose a two-stage regulator and was not part of the substantive rejection. Similarly, applicant argues that NoOutage is not part of the substantive rejection.

3. Applicant argues that Bassguitarist1985 does not disclose a quick disconnect couple to an outlet of the demand regulator (i.e. the secondary pressure regulator).

4. Applicant argues that NoOutage does not disclose a regulator mounting device which secures to a pressurized fuel source since the connecting rod of it simply rest on the pair of pressure fuel containers.

In response to arguments:

1. At 9:59 the "demand regulator" (typically a second stage of a regulation system) is shown adjacent the generator. The fact that the user discusses where he would possibly attach it is irrelevant. The regulator is shown in a way that would allow for functionality and thus anticipates the limitation.

Applicant argues that Chuck Webb is irrelevant as it is not part of the substantive rejection. This is a mischaracterization of the purpose of Chuck Webb. The rejection is not over BassGuitarist1985's words or his specific video, the rejection is over *the device which is being shown* regardless of *who* is showing it. In this case, BassGuitarist1985 is explaining *the same*

device as that shown in Chuck Webb. The point of Chuck Webb is to elaborate upon the reference of BassGuitarist1985, to show proof that the *same device* of BassGuitarist1985 is capable of, and been used by someone, operating as an off-board regulator. The rejection is with regards to the modified Yamaha generator shown in both references, it is not contained to what the user in BassGuitarist1985 manages to show or say in their video. Thus the device shown in BassGuitarist1985 anticipates the claims as per the further showing of the same device in Chuck Webb.

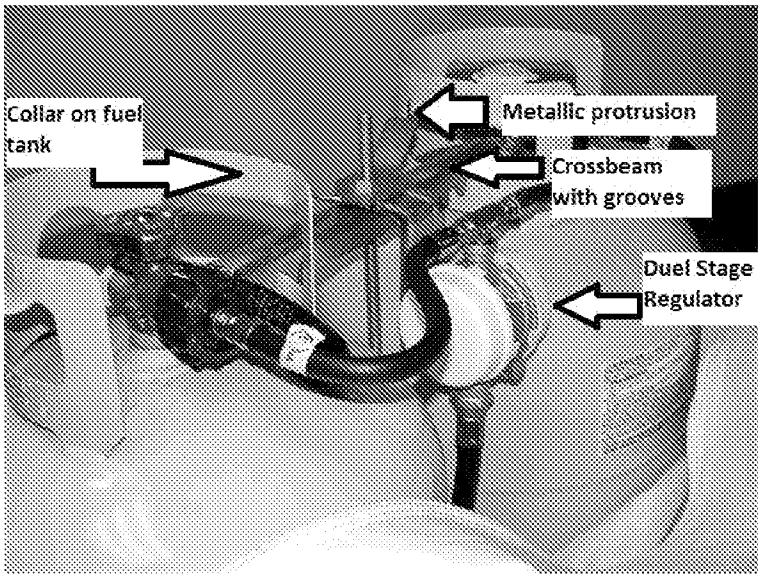
2. Regarding Chuck Webb, see above; Chuck Webb is not included in the claim rejection but the device of Chuck Webb is included in the rejection. Chuck Webb is being used to show the state of the art and as an exemplary reference to further define the device of the original prior art reference. NoOutage is not part of the rejection, not does it need to be as it was simply a side discussion for the sake of shortening prosecution.

3. Claims 7 and 18 never state where in the lines the quick-connect portion of the quick-connect hose couple is included, simply that the quick-connect hose coupling as a hole includes: a first end couple to an outlet of the secondary pressure regulator (shown in BassGuitarist1985 and including the specific quick-connection point); a second end couple to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line (a line is shown from the regulator into the engine as is necessary for functionality and wherein these parts may be considered the other end of the quick connect coupling). It is noted that if the claims are amended to include the male end of the coupling downstream from the secondary regulator this is unlikely to overcome a 103 rejection using BassGuitarist1985 due to the commonality of quick-connect couplings at various points in any gaseous transport system.

4. The claims discussed specified a pressurized fuel source with a collar, which is very clearly shown in NoOutage, wherein NoOutage has two pressurized fuel tanks (typically referred to simply as "propane tanks") which both have collars.

A very obvious duel dual-stage regulator is shown attached to the metallic crossbeam between the collars. Thus NoOutage also shows that both regulators can or would be attached to this crossbeam.

The crossbeam is further shown resting on the collars wherein grooves within the beam allow it to be secured via gravity and friction in place. While the device is not fastened to the collars via bolts or some other fastener, it is shown very clearly secured in place via the grooves and "mounted on" on the collars. There is also a metallic protrusion from a central bolt that appears to interfere with the collar which would further secure the beam in place. Thus NoOutage shows a first and second regulator secured to at least one pressurized fuel tank collar. The regulators of NoOutage are shown "positioned adjacent each other along an outer periphery of the collar" as claimed and shown. Thus the rejection above is simply modifying previous prior art rejection to include the shown constructions.



References:

BassGuitarist1985 (Jan. 3rd, 2014, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", https://www.youtube.com/watch?v=caZawwDaRQg).

Chuck Webb (Sep. 24th, 2017, "Yamaha ef2000is running on the propane quick connect pulling the Coleman air conditioner", https://www.youtube.com/watch?v=L6TB9nqbqtg)

NoOutage (Nov. 13th, 2006, "Standby Generator Set", http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm and http://web.archive.org/web/20060928183104/http://www.nooutage.com/images/BS-7KW_Power_Now_tanks.jpg)

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Advisory Action Before the Filing of an Appeal Brief	Application No. 16/783,455	Applicant(s) Sarder et al.	
	Examiner KEVIN A LATHERS	Art Unit 3747	AIA (FITF) Status Yes

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

THE REPLY FILED 31 March 2021 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 ____ 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 APPLICANTS 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 37CFR 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 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicants 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: _____.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: Applicant's amendments and arguments fail to place the application in condition for allowance. See the attached documents.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1-19.
    Claim(s) withdrawn from consideration:_____.

/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	

Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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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 Kevin A. Lathers** at the Patent and Trademark Office.

■ transmitted by EFS-WEB addressed to **Examiner Kevin A. Lathers** at the Patent and Trademark Office.

Date: March 31, 2021 /Robyn L. Templin/
Signature

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

AFTER-FINAL
AMENDMENT/RESPONSE TO FINAL OFFICE ACTION
MAILED FEBRUARY 1, 2021

Dear Sir:

Responsive to the Final Office Action mailed February 1, 2021, please amend the Application as follows and consider the following remarks:

OK TO ENTER: /K.A.L/

Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

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37 CFR 1.8(a) **37 CFR 1.10**

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■ transmitted by EFS-WEB addressed to **Examiner Kevin A. Lathers** at the Patent and Trademark Office.

Date: March 31, 2021 /Robyn L. Templin/
Signature

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

AFTER-FINAL
AMENDMENT/RESPONSE TO FINAL OFFICE ACTION
MAILED FEBRUARY 1, 2021

Dear Sir:

Responsive to the Final Office Action mailed February 1, 2021, please amend the Application as follows and consider the following remarks:

In the Claims

1. (Original) A generator and fuel delivery system comprising:

a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and

regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

2. (Original) The generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

3. (Original) The generator and fuel delivery system of claim 2 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

4. (Original) The generator and fuel delivery system of claim 1 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

5. (Original) The generator and fuel delivery system of claim 4 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

6. (Original) The generator and fuel delivery system of claim 5 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve;

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

wherein, when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator; and

wherein, when the mechanical fuel valve is in the second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

7. (Original) The generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and

wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

8. (Original) The generator and fuel delivery system of claim 7, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

9. (Original) The generator and fuel delivery system of claim 8, wherein the primary pressure regulator is mounted on the regulator mounting device.

10. (Original) The generator and fuel delivery system of claim 9, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

11. (Original) A generator and fuel delivery system comprising:

a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage; and

regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator;

wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.

12. (Original) The generator and fuel delivery system of claim 11 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. (Original) The generator and fuel delivery system of claim 12 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

14. (Original) The generator and fuel delivery system of claim 11 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

15. (Original) The generator and fuel delivery system of claim 14 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

16. (Original) A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator;

wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.

17. (Original) The dual fuel generator and fuel delivery system of claim 16 wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

18. (Original) The dual fuel generator and fuel delivery system of claim 16, further comprising a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

19. (Currently Amended) The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

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UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**03/31/2021 05:59:51 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60168808	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Andrew Stark

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2021.03.31 Response.pdf		13	-	176 KB
2021.03.31 Response-A.NE.pdf	(1-1)	1	Response After Final Action	117 KB
2021.03.31 Response-CLM.pdf	(2-5)	4	Claims	92 KB
2021.03.31 Response-REM.pdf	(6-13)	8	Applicant Arguments/Remarks Made in an Amendment	134 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2021.03.31 Response.pdf	B0F3D9A814F0F8D9579B610CA34E545FD4B45C1C15DDD41A AA10916D99A7BBA7F7FDCF4F20B3E639376BD2176DDEF4F83 F947C24F3404AB8621A4FDFAEBA8661
2021.03.31 Response-A.NE.pdf	5C17949AD94397762814A643AD7BF7CC651CD291CAB193E0E BDD74B63DB9BAA39FF2043C2A0FAE0729C38CAA724610BCF EE7A3C839044DBE99AE15A2742CD2DC
2021.03.31 Response-CLM.pdf	F72BF578F7A357D9DCB68C4A85CA83FD6C0DBFC1654184541 08F537745D7B0939DC2FD1B19CE298732035CD16AFDAD3325 483D6512E8D11A04840F6C434011FE
2021.03.31 Response-REM.pdf	93CAF5E207923591D9ACB43F2CC217E65717D0A84CA8AF916 D5D10970F641C7874B90A44240F659B7FB93CAE5E514BF4271 747E74BA3344DA5A550F47ADA68E5

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 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 1-19 are pending in the present application. In the Final Office Action mailed February 1, 2021, the Examiner rejected claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v= caZawwDaROg). The Examiner next rejected claims 2, 12, and 17 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985. Claims 3, 8-10, 13, and 19 were rejected under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of NoOutage (NoOutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm). Claims 5 and 15 were rejected under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al. (US Pub. 2011/0168133). Claims 1-19 were provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. 16/191,503.

Claim 6 was indicated as containing allowable subject matter. Such indication is appreciated.

Claim 19 has been amended herein to correct antecedent basis by changing "the regulator mounting device" to "a regulator mounting device". No new matter is added by way of the amendment.

Double Patenting Rejection

The Examiner provisionally rejected claims 1-19 on the ground of non-statutory double patenting as being unpatentable over claims 1-17, 21, and 22 of co-pending Application No. 16/191,503.

Applicant notes that the double patenting rejection is not the only remaining rejection in the present application. The Examiner has also applied rejections under 35 U.S.C. §102(a)(1) and 35 U.S.C. §103 in the current Office Action. Applicant, therefore, requests that the double patenting rejection be held in abeyance pending resolution of the other rejections.

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985

Claims 1, 11, and 16

The Examiner rejected independent claims 1, 11, and 16 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel

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Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaROg). In rejecting the claims, the Examiner asserted (in part) that Bassguitarist1985 discloses "a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source… (Title and 16:48 to 18:10)" and "a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent a quick-connect hose attachment for attachment to a fuel source)." *Final Office Action*, February 1, 2021, pp. 2-3.

Applicant respectfully disagrees with the rejection and believes claims 1, 11, and 16 to be patentably distinct from that which is disclosed in Bassguitarist1985. That is, Bassguitarist1985 does not anticipate that which is called for in claims 1, 11, and 16, as anticipation under 35 U.S.C. §102 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 (Fed. Cir. 1989)). As will be set forth in detail here below, Bassguitarist1985 does not disclose each and every element of claims 1, 11, and 16 and thus does not anticipate the claims, 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)).

Bassguitarist1985 discloses a gasoline generator that is converted into a tri-fuel generator. *See Bassguitarist1985*, Title. As part of the conversion to enable the generator to use propane, a demand regulator is utilized. The demand regulator may be mounted to the generator in a number of locations, such as by mounting the demand regulator outside the generator intake by drilling into the generator housing (*Bassguitarist1985*, 10:00, 11:40), by mounting the demand regulator on the back cover of the generator housing (*Bassguitarist1985*, 14:55), or by mounting the demand regulator to/on a foot of the generator using a bracket. *Bassguitarist1985*, 19:40.

More specifically, Bassguitarist1985 discloses that the generator is disassembled for installation of a tri-fuel conversion kit. *Bassguitarist1985*, 3:20. Bassguitarist1985 discloses that the tri-fuel conversion kit includes a motor snorkel that couples between the carburetor and air breather hose. *Bassguitarist1985*, 4:50. The motor snorkel includes a probe that provides fuel to the carburetor from a hose for incoming propane or natural gas. *Bassguitarist1985*, 4:50. Bassguitarist1985 discloses that the hose for incoming propane or natural gas can exit the generator through a hole drilled near the generator intake or through a hole drilled near the back cover.

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Bassguitarist1985, 9:45, 11:25, 14:05. A demand regulator mounts to the generator adjacent to the hose for incoming propane or natural gas, with an outlet of the demand regulator coupled to the hose. *Bassguitarist1985*, 9:45, 11:25. Specifically, the narrator of the Bassguitarist1985 video stated that "I've seen the demand regulator mounted outside…the intake," "getting back to where to mount this thing" (while pointing to the demand regulator), "I've seen guys actually mount the demand regulator right on the back of the back cover," and "circling back to how to mount that demand regulator." *Bassguitarist1985*, 9:55, 11:25, 14:45, 18:50. According to the narrator, the conversion process of the current generator includes mounting the demand regulator to/on a foot of the generator using a bracket, so as not to interfere with a generator cover used for storage. *Bassguitarist1985*, 19:40.

Bassguitarist1985, however, does **not** teach a fuel regulator system - comprising a first stage and a second stage – that is located *off-board* the generator. Instead, in each of the mounting arrangements disclosed in Bassguitarist1985, the demand regulator is mounted *on-board* the generator – i.e., physically coupled/mounted directly to the generator – with the demand regulator mounted either directly adjacent the generator intake, on the back cover of the generator housing, or to/on a foot of the generator using a bracket. *Bassguitarist1985*, 10:00, 11:40, 14:55, 19:40. That is, the demand regulator mounts on-board the generator near the hose for incoming propane or natural gas that provides fuel to the motor snorkel. Bassguitarist1985 discloses that the demand regulator mounts adjacent the generator intake if the hose enters the generator though a hole drilled in a side of the generator above the intake, the demand regulator mounts on the back cover if the hose enters the generator through a hole drilled in the back of the generator at a lower end, and that the demand regulator mounts to/on a foot of the generator using a bracket if the hose enters the generator through a hole drilled through the intake plate cover. *Bassguitarist1985*, 11:25, 13:00, 14:05, 19:40. Further, the narrator of the Bassguitarist1985 video makes many statements clearly indicating that the demand regulator is mounted on-board the generator.

Additionally, to the extent that Bassguitarist1985 teaches a generator "free of any pressure regulator," as asserted by the Examiner, Applicant notes that such a teaching is only provided in the context of the EF2000iS Yamaha generator as it is configured *before the conversion* thereof to a tri-fuel generator (i.e., when it is a gasoline only generator). In such a configuration, it is not a generator that is "configured to operate on a gaseous fuel supplied from a pressurized fuel source" as called for in claims 1, 11, and 16 – but instead is only configured to operate on gasoline. After conversion to a tri-fuel generator, the generator is then no longer "free of any pressure regulator,"

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as instead, the generator then includes a demand regulator mounted *on-board* the generator, as explained in detail above.

In the Response to Arguments section of the Final Office Action, the Examiner asserted that "as shown at 9:57, the demand regulator is shown sitting on the table before the user describes possibly fixing it to the generator. The regulator shown is fluidly connected and the generator would be operable at this time." *Final Office Action*, pp. 8-9. Contrary to the Examiner's assertion, the generator is shown in a disassembled state without the snorkel coupled to the carburetor to provide propane or natural gas to the engine from the demand regulator. *See Bassguitarist1985*, 9:57. Thus, the demand regulator is not fluidically connected and the generator would not be operable at this time. The Examiner also said to "see Chuck Webb (Chuck Webb, https://youtu.be/L6TB9nqbqtg, 'Yamaha ef200is running on the propane quick connect pulling the Coleman air condition'). Chuck Webb is shown at 0:00 with an identical Yamaha generator having an on demand regulator mounted to a wagon nearby separate from the generator." *Final Office Action*, p. 9. However, Chuck Webb does not disclose a fuel regulator system comprising a first stage and a second stage and was not part of the substantive rejection of claims 1, 11, or 16 under 35 U.S.C. §102(a)(1). *See Chuck Webb*, supra. Further, the Examiner's reference to NoOutage "for the sake of argument" *(See Final Office Action*, p. 10) was not part of the substantive rejection of claims 1, 11, or 16, and NoOutage does not disclose a generator free of any pressure regulator. *See NoOutage*. Thus, the Examiner has not shown that *Bassguitarist1985* discloses a fuel regulator system - comprising a first stage and a second stage (claims 1 & 11) or a primary pressure regulator and a secondar pressure regulator (claim 16) – that is located *off-board* the generator.

In light of at least the above, Bassguitarist1985 does not anticipate that which is called for in claims 1, 11, and 16, as anticipation under 35 U.S.C. §102 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*, 868 F.2d at 1236). Applicant therefore believes that each of claims 1, 11, and 16 is patentably distinct from Bassguitarist1985 and respectfully requests withdrawal of the rejection of claims 1, 11, and 16 and the claims dependent therefrom.

Claims 7 and 18

The Examiner rejected dependent claims 7 and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v= caZawwDaROg). In support of the rejections the Examiner stated:

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> Bassguitarist1985 discloses…a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line ((as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

Final Office Action, p. 3. Applicant respectfully disagrees with the rejection of claims 7 and 18.

Claims 7 and 18 call for, in part, a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator, and a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator. In contrast, Bassguitarist1985 discloses a quick disconnect coupled to an inlet of a demand regulator. *Bassguitarist1985*, 16:45. Bassguitarist1985 does not disclose a quick disconnect coupled to an outlet of the demand regulator. *Id.* Claims 7 and 18 call for an arrangement having the primary pressure regulator located upstream from the secondary pressure regulator. Thus, a quick connect between the Examiner's asserted "first regulator" and "second regulator" of Bassguitarist1985 does not teach a quick-connect hose coupling including a first end coupled to an *outlet* of a secondary pressure regulator. As such, the Bassguitarist1985 does not disclose a quick-connect hose coupling including a first end coupled to an outlet of a secondary pressure regulator, and a second end coupled to an inlet of a gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line to supply fuel to a generator, as called for in claims 7 and 18.

Accordingly, Bassguitarist1985 does not teach or suggest each and every element of claims 7 or 18. Therefore, Applicant believes claims 7 and 18 are patentably distinct from Bassguitarist1985 and respectfully requests withdrawal of the rejection of claims 7 and 18, and the claims depending therefrom.

Rejection under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of NoOutage

Claims 8 and 19 (and claim 10)

The Examiner rejected dependent claims 8 (and claim 10 which depends from 8 via intervening claim 9) and 19 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v= caZawwDaROg) in view of NoOutage (NoOutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm). In support

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of the rejection, the Examiner stated that "Bassguitarist1985 discloses the generator and fuel delivery system of claims 2 and 7, but fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container." *Final Office Action*, p. 5. The Examiner further stated, "Nooutage discloses a fuel system for a generator…, wherein the fuel system includes liquid propane gas containers with a collar mounting bracket supporting a dual-stage regulator ("Hose connection to portable tanks",…)." *Id.* The Examiner asserted that "it would have been obvious…to move the regulators of Bassguitarist1985 to a collar mounting bracket as shown in Nooutage." *Id.* Applicant respectfully disagrees with the rejection of claims 8 and 19 (and claim 10).

Claim 8 calls for, in part, a generator and fuel delivery system including a regulator mounting device secured to a pressurized fuel source with at least a secondary pressure regulator mounted on the regulator mounting device. By dependency on claim 7, claim 8 further calls for a first stage comprising a primary pressure regulator and a second stage comprises the secondary pressure regulator. By dependency on claim 1 (via intervening claim 7), claim 8 further calls for gaseous fuel from the first stage regulated down to a desired pressure in the second stage.

Claim 19 (and claim 10) calls for a generator and fuel delivery system wherein a pressurized fuel source includes a pressurized fuel container having a collar, and wherein a regulator mounting device secures to the collar so that primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.

Contrary to the Examiner assertion, the Examiner has provided no indication of any prior art that suggests an arrangement as called for in claims 8 and 19 where a regulator mounting device is secured to a pressurized fuel source with at least a secondary pressure regulator mounted on the regulator mounting device. Initially, the Examiner admitted that Bassguitarist1985 "fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container." *Final Office Action*, p. 5. Additionally, NoOutage fails to teach the arrangement called for in claims 8 and 19 – as instead NoOutage teaches (at best) a single primary pressure regulator positioned between (and shared by) a pair of pressurized fuel containers and that is attached to the containers via a connecting rod extending between the collars. *See NoOutage.* Further, NoOutage does not disclose that a regulator mounting device secures to a pressurized fuel source since the connecting rod disclosed by NoOutage simply rests on the pair of pressurized fuel containers to hold the single primary pressure regulator therebetween. Thus, neither Bassguitarist1985, nor NoOutage, nor a combination thereof

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teach or suggest a regulator mounting device secured to a pressurized fuel source with a secondary pressure regulator mounted thereon, as called for in claims 8 and 19 (and claim 10).

Accordingly, Applicant believes claims 8 and 19 (and claim 10) to be patentably distinct over a combination of Bassguitarist1985 and NoOutage, and thus Applicant requests withdrawal of the rejection of claims 8 and 19 (and claim 10), and the 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 1-19.

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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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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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/783,455	Filing Date 02/06/2020	☐ 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 $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	03/31/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	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".	/Ruby Johnson/
*** 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.**

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Courtesy Reminder for
Application Serial No: 16/783,455

Attorney Docket No: CET1090.074
Customer Number: 26629
Date of Electronic Notification: 02/01/2021

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 02/01/2021

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EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
02/01/2021	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
jmf@zpspatents.com

Office Action Summary	Application No. 16/783,455	Applicant(s) Sarder et al.	
	Examiner KEVIN A LATHERS	Art Unit 3747	AIA (FITF) 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 _____.

☐ 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) 1-19 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) 1-19 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

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

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ 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: Chuck Webb.

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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.

Claim Rejections - 35 USC § 102

2. 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.

3. 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)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

4. Claim(s) 1, 4, 7, 11, 14, 16, and 18 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaRQg).

5. **Regarding claims 1 and 11,** Bassguitarist1985 discloses a dual fuel generator and fuel delivery system (Title) comprising: a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line (Title and 16:48 to 18:10, lines allowing pressurized LPG into the tank are shwon); a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent

a quick-connect hose attachment for attachment to a fuel source), the fuel regulator system configured to: regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator (as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

6. **Regarding claims 4, 14, and 16,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 and as it pertains to claim 16, wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line (2:13, a EF2000iS Yamaha generator is shown, the EF2000iS being a gasoline generator and therefore operating via liquid fuel supplied via liquid fuel sources and lines)

7. **Regarding claims 7 and 18,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line ((as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

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. Claim 2, 12, and 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985.

11. **Regarding claims 2, 12, and 17,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

12. However, dual stage regulators for gaseous fuel systems are old and well-known in the art sufficient for examiner to take official notice that it would have been obvious to one of ordinary skill in the art before the filing date of the invention to include a dual stage regulator as either a combination of the included two regulators or in place of either of the regulators, as dual stage regulators are known devices that improve the efficiency and reliability of a pressure regulation system.

13. Claim 3, 8-10, 13, and 19 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm).

14. **Regarding claims 3, 8-10, 13, and 19,** Bassguitarist1985 discloses the generator and fuel delivery system of claims 2 and 7, but fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container.

15. Nooutage discloses a fuel system for a generator (first section, the object being an LP generator), wherein the fuel system includes liquid propane gas containers with a collar mounting bracket supporting a dual-stage regulator ("Hose connection to portable tanks", the image reproduced below).



16. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to move the regulators of Bassguitarist1985 to a collar mounting bracket as shown in Nooutage as it would constitute nothing more an applying a known technique of mounting a regulator in a secure and easily accessible position being applied to a known and similar device – the dual fuel generator LPG fuel system – to yield predictable and known results. Further, the devices operation would not be impacted in any way, shape, or form and would function identically, the only difference being in the ease of usage of an operator and safety of the regulators (instead of dangling, they would be firmly mounted to the fuel sources). *Ruiz v. AB Chance Co.*, 357 F.3d 1270, 69 USPQ2d 1686 (Fed. Cir. 2004)

17. Claim 5 and 15 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al (US 2011/0168133).

18. **Regarding claim 5 and 15,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 4, but fails to disclose further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

19. Pursifull discloses an engine system operating on a liquid fuel and a gaseous fuel (¶ [0022], the gaseous fuel being a fuel such as propane), wherein the fuel systems are controlled via a three-way valve 120 (Fig. 1, shown), and wherein this valve actuates and controls which fuel reaches the engine 102 (¶ [0025]). This valve control allows further control of the fuel system and allows for fuel shut off to both systems if need be in order to allow for a reduction in emissions and improved engine operation (¶ [0004] and [0005]).

20. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to modify the bass device of Bassguitarist1985 with the ideas of Pursifull, wherein a mechanical valve may be installed up stream of a fuel rail (or in the case of Bassguitarist1985, a carburetor), in order to more precisely control fuel flow and reduce engine emissions.

Double Patenting

21. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious

over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

22. Claims 1-19 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. 1**6/191,503** (reference application). Although the claims at issue are not identical, they are not patentably distinct from each other because the limitations contained within the instant application are identical to those of the reference application. The only difference in application scopes being the instant applications limitation

of the generator being free from regulators, however the reference application does not disclose the generator including a regulator and instead specifically states that the regulators are located off-board from the generator.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Allowable Subject Matter

23. Claim 6 is would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if the double-patenting rejection above is overcome.

24. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art fails to disclose or make obvious a mechanical fuel valve that when actuated blocks the coupling of the fuel systems to the dual fuel generator from their fuel source.

Response to Arguments

25. Applicant's arguments filed 10/22/2010 have been fully considered but they are not persuasive.

26. Applicant argues:

a. Bassguitarst1985 fails to disclose the regulators being off-board as the regulators may be mounted on the generator housing (Bassguitarist1985, 10:00, 11:40, 14:55, and 19:40). Thus this would constitute as being on-board.

b. Further, applicant argues that the generator is only free of regulators before the conversion (as it is a gasoline powered generator) and that, when modified as shown, it would no longer be free of any pressure regulator due to the on-board mounting of a regulator.

27. With regards to both arguments, it is noted that what is essentially being argued is whether the regulator being shown mounted on the generator means that it MUST be mounted on the generator. However, as shown at 9:57, the demand regulator is shown sitting on the table before the user

describes possibly fixing it to the generator. The regulator shown is fluidly connected and the generator would be operable at this time. Thus, the generator as shown – even if the user describes further possible modifications -- contains an off-board regulator and would function with it.

28. To elaborate upon this and act as proof that the regulator would function and does function with the regulator unattached, see Chuck Webb (Chuck Webb, https://youtu.be/L6TB9nqbqtg, "Yamaha ef200is running on the propane quick connect pulling the Coleman air condition"). Chuck Webb is shown at 0:00 with an identical Yamaha generator having an on demand regulator mounted to a wagon nearby separate from the generator. This is the same generator as BassGuitarist1985 using the same modification and thus is the same referenced art as BassGuitarist1985 shown operational with the regulator off-board.



29. Further, and for the sake of argument, even if the generator inherently necessitated the regulator's attachment in the configuration as shown, the 103 rejection making use of Nouutage above discloses a modification in which a dual stage regulator is used and attached to the gaseous fuel storage tanks themselves. This modification would cause the regulator to be considered off-board as it would move both regulators into attachment with the fuel storage devices.

30. Thus, the regulators as shown and described are off-board and therefore the Yamaha generator of the videos remains regulator free.

Conclusion

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.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN A LATHERS whose telephone number is (571)272-1050. The examiner can normally be reached on M-F 10a-6p.

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 5712721196. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Notice of References Cited	Application/Control No. 16/783,455	Applicant(s)/Patent Under Reexamination Sarder et al.	
	Examiner KEVIN A LATHERS	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					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	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	Chuck Webb, https://www.youtube.com/watch?v=L6TB9nqbqtg, "Yamaha ef2000is running on the propane quick connect pulling the Coleman air conditioner" (Year: 2017)
	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	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	07/21/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
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	12	✓								
	13	✓								
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	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

CPC - Searched*		
Symbol	Date	Examiner
F02D19/0613, 19/0605, 19/0647	07/21/2020	/k.L./
Y02Y10/36	07/21/2020	/k.L./

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
Google and EAST searches.	07/21/2020	/k.L./
Inventor and assignee search.	07/21/2020	/k.L./
Youtube search.	01/27/2021	/K.L./

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

/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	

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IPR2025-01463

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

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16783455
Filing Date	2020-02-06
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	2398437		1946-04-16	McGill et al.	
	2	3911956		1975-10-14	LeBreton et al.	
	3	4323046		1982-04-06	Barber	
	4	4375795		1983-03-08	Billingsley	
	5	4471805		1984-09-18	Solie et al.	
	6	4492207		1985-01-08	Hallberg	
	7	4750514		1988-06-14	Omori et al.	
	8	4788960		1988-12-06	Oshizawa	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.A.L/

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	9	5934320		1999-08-10	O'Reilly et al.	
	10	6543395	B2	2003-04-08	Green	
	11	6591817	B2	2003-07-15	Deutsch	
	12	7591257	B2	2009-09-22	Bayer et al.	
	13	7802562	B2	2010-09-28	Lippa et al.	
	14	7905469	B2	2011-03-15	Nickels et al.	
	15	8042569	B2	2011-10-25	Morris	
	16	8757139	B2	2014-06-24	Deng	
	17	8944027	B2	2015-02-03	Montgomery	
	18	9175601	B2	2015-11-03	Markoski	

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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
	1	20070137591	A1	2007-06-21	Sugimoto et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2401704	CN	Y	2000-10-18	Zhejiang University		
	2	102006008524	DE	A1	2006-08-31	Voss Automotive GMBH		
	3	189800	GB	A	1923-10-11	Sonderegger		
	4	532903	GB	A	1941-02-03	Henderson et al.		

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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]
	1	Multi-Power Ltd., MODELMP5500DF 13 HP Generator Owner's Manual, July 2006, pp. 1-38	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.A.L/

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	Examiner Name	Kevin A. Lathers
	Attorney Docket Number	CET1090.074

	2	Winco Inc., Home Power TRI-FUEL Portable Generators Owners Manual, November 21, 2017, pp. 1-16	
	3	Winco Inc., HPS9000VE/E and HPS9000VE-03/A Generator Installation and Operators Manual, August 9, 2013, pp. 1-16	
	4	Winco Inc., Dyna ME5000VA Installation, Operation, and Maintenance Instructions, November 21, 2017, pp. 1-12	
	5	Winco Inc., Dyna DL9000E, DL5000H, and D3000 Portable Generators Installation, Operation, and Maintenance Instructions, November 21, 2017, pp. 1-12	
	6	PowerLand Industrial Tools, Powerland Tri Fuel Generator Owner's Manual, December 24, 2015, pp. 1-41	
	7	Winco Inc., HPS6000HE/I Bi-Fuel Generator Installation and Operators Manual, March 8, 2010, pp. 1-20	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/KEVIN A LATHERS/	Date Considered	01/27/2021

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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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16783455
Filing Date	2020-02-06
First Named Inventor	Mark J. Sarder et al.
Art Unit	3747
Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

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).

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See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2020-12-15
Name/Print	Kevin R. Rosin	Registration Number	55584

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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PTO/SB/08a (02-18)
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Examiner Name	Kevin A. Lathers
Attorney Docket Number	CET1090.074

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	2398437		1946-04-16	McGill et al.	
	2	3911956		1975-10-14	LeBreton et al.	
	3	4323046		1982-04-06	Barber	
	4	4375795		1983-03-08	Billingsley	
	5	4471805		1984-09-18	Solie et al.	
	6	4492207		1985-01-08	Hallberg	
	7	4750514		1988-06-14	Omori et al.	
	8	4788960		1988-12-06	Oshizawa	

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	9	5934320		1999-08-10	O'Reilly et al.	
	10	6543395	B2	2003-04-08	Green	
	11	6591817	B2	2003-07-15	Deutsch	
	12	7591257	B2	2009-09-22	Bayer et al.	
	13	7802562	B2	2010-09-28	Lippa et al.	
	14	7905469	B2	2011-03-15	Nickels et al.	
	15	8042569	B2	2011-10-25	Morris	
	16	8757139	B2	2014-06-24	Deng	
	17	8944027	B2	2015-02-03	Montgomery	
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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
	1	20070137591	A1	2007-06-21	Sugimoto et al.	

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	1	2401704	CN	Y	2000-10-18	Zhejiang University		
	2	102006008524	DE	A1	2006-08-31	Voss Automotive GMBH		
	3	189800	GB	A	1923-10-11	Sonderegger		
	4	532903	GB	A	1941-02-03	Henderson et al.		

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Multi-Power Ltd., MODELMP5500DF 13 HP Generator Owner's Manual, July 2006, pp. 1-38	

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	Attorney Docket Number	CET1090.074

	2	Winco Inc., Home Power TRI-FUEL Portable Generators Owners Manual, November 21, 2017, pp. 1-16	
	3	Winco Inc., HPS9000VE/E and HPS9000VE-03/A Generator Installation and Operators Manual, August 9, 2013, pp. 1-16	
	4	Winco Inc., Dyna ME5000VA Installation, Operation, and Maintenance Instructions, November 21, 2017, pp. 1-12	
	5	Winco Inc., Dyna DL9000E, DL5000H, and D3000 Portable Generators Installation, Operation, and Maintenance Instructions, November 21, 2017, pp. 1-12	
	6	PowerLand Industrial Tools, Powerland Tri Fuel Generator Owner's Manual, December 24, 2015, pp. 1-41	
	7	Winco Inc., HPS6000HE/I Bi-Fuel Generator Installation and Operators Manual, March 8, 2010, pp. 1-20	

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Examiner Signature		Date Considered	

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Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2020-12-15
Name/Print	Kevin R. Rosin	Registration Number	55584

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**12/15/2020 11:48:04 AM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60119786	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Kevin Rosin

Documents

TOTAL DOCUMENTS: 12

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2020.12.15 Supp IDS.pdf	6	Information Disclosure Statement (IDS) Form (SB08)	984 KB
FPD1-CN2401704Y.pdf	6	Foreign Reference	1808 KB
FPD2-DE102006008524A1.pdf	16	Foreign Reference	2597 KB
FPD3-GB189800A.pdf	4	Foreign Reference	690 KB
FPD4-GB532903A.pdf	5	Foreign Reference	1211 KB
NPL1-Multi-Power MODELMP5500DF 13 HP	38	Non Patent Literature	23502 KB

Generator Owner's Manual.pdf			
NPL2-Winco Home Power TRI-FUEL Portable Generators Owners Manual.pdf	16	Non Patent Literature	730 KB
NPL3-Winco HPS9000VEE and HPS9000VE-03A Manual.pdf	16	Non Patent Literature	1961 KB
NPL4-Winco Dyna ME5000VA.pdf	12	Non Patent Literature	118 KB
NPL5-Dyna Portable Generators.pdf	12	Non Patent Literature	104 KB
NPL6-PowerLand Tri Fuel Generator Owner's Manual.pdf	41	Non Patent Literature	7016 KB
NPL7-Winco HPS6000HEI Manual.pdf	20	Non Patent Literature	8337 KB

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DOCUMENT	MESSAGE DIGEST(SHA-512)
2020.12.15 Supp IDS.pdf	A2FEF3657B908176C33D1E309DC98ADB12E60E3D5B7A43FB5C20C603A8BC78ABE2694DA748FB292173031C07F8D6DF322639F213B724E1AC3F825A27FC4A837D
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NPL3-Winco HPS9000VEE and HPS9000VE-03A Manual.pdf	BAE4D902E0B325CCB1879F1ED0380AB272BBB496B4EB2B8B3E7AA784C5D626D71923A344FB6D99DDA4F025EF919C2715C1FB16FF38C71E697D0C45A059963889
NPL4-Winco Dyna ME5000VA.pdf	A28406FA1D740D0C404BDFB26D8B53DF7C670B37881C05F68715FDF2882650E94C6662D75EB05F70CD05901128AC53A61EE116D4DEEFF64CF4FA30FD11A89F97
NPL5-Dyna Portable Generators.pdf	AE368FA7D80F9CD099493863F4DDB2F03FF5D15884D65947E5A483CC9665F8416314728C87380F2D9C13AD4910E6325EFE624E21E34391F8529F8C42563318E4
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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

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Espacenet

Bibliographic data: CN2401704 (Y) — 2000-10-18

Gas power booster for dual-fuel gasoline engine

Inventor(s): XIA LAIQING [CN]; XIONG SHUSHENG [CN]; WANG JUNPEI [CN] ± (LAIQING XIA, ; SHUSHENG XIONG, ; JUNPEI WANG)

Applicant(s): UNIV ZHEJIANG [CN] ± (ZHEJIANG UNIV)

Classification: **- international:** ***F02M43/00;*** (IPC1-7): F02M43/00
- cooperative:

Application number: CN19992050994U 19991123

Priority number(s): CN19992050994U 19991123

Abstract of CN2401704 (Y)

The utility model discloses a gas power booster for a double-fuel gasoline engine. A gasoline cut-off electromagnetic valve of the original double-fuel engine is connected in parallel with an electromagnetic valve for controlling the flow quantity of gasoline, and meanwhile, a throttle valve of a carburetor of the original engine is provided with a travel switch, wherein the on-off of the travel switch is automatically controlled by the opening degree of the throttle valve of the carburetor, and the travel switch is used for controlling to open and close the electromagnetic valve. The utility model has the advantages that the structure is simple and reliable, the power of the double-fuel gasoline engine when in the combustion of gas can be close to or even reach the level when in the combustion of fuel by using the gas power booster, and the good exhaust performance and the economic performance index of the engine when in the combustion of gas can not be affected.

[19]中华人民共和国国家知识产权局

[51]Int. Cl[7]
F02M 43/00

[12]实用新型专利说明书

[21] ZL 专利号 99250994.7

[45]授权公告日 2000 年 10 月 18 日

[11]授权公告号 CN 2401704Y

[22]申请日 1999.11.23 [24]颁证日 2000.8.12

[73]专利权人 浙江大学
地址 310027 浙江省杭州市玉古路 20 号
[72]设计人 夏来庆 熊树生 汪均培 魏建勤
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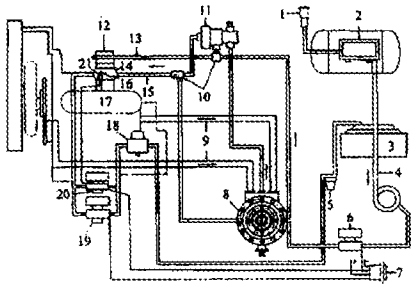
[21]申请号 99250994.7
[74]专利代理机构 浙江大学专利代理事务所
代理人 张法高

权利要求书 1 页 说明书 2 页 附图页数 1 页

[54]实用新型名称 双燃料汽油发动机燃气动力提高装置

[57]摘要

本实用新型公开了一种双燃料汽油发动机燃气动力提高装置。它在原双燃料发 动机汽油截断电磁阀上，并联一个控制汽油流量的电磁阀，同时在原发动机化 油器节气门上，设置一个通断由化油器节气门的开度自动控制的，并用来控制 电磁阀启闭的行程开关。本实用新型的优点：结构简便可靠，使用它能使双燃 料发动机燃气时的动力接近，甚至达到燃油时的水平，而不影响发动机燃气时 的良好排放性能及经济性能指标。



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权 利 要 求 书

1．一种双燃料汽油发动机燃气动力提高装置，其特征在于在原双燃料发动机汽油截断电磁阀[19]上，并联一个控制汽油流量的电磁阀[20]，同时在原发动机化油器[14]节气门[16]上，设置一个通断由化油器节气门的开度自动控制的，并用来控制电磁阀启闭的行程开关[21]。

2．根据权利要求 1 所述的一种双燃料汽油发动机燃气动力提高装置，其特征在于控制汽油流量的电磁阀[20]，其负极接到行程开关的活动端上，正极与电磁阀[6]的正极相连。

3．根据权利要求 1 或 2 所述的一种双燃料汽油发动机燃气动力提高装置，其特征在于所说的行程开关[21]为柱塞型行程开关，该开关的活动端与控制汽油流量的电磁阀[20]的负极相连，固定端搭铁。

说 明 书

双燃料汽油发动机燃气动力提高装置

本实用新型涉及一种双燃料汽油发动机燃气动力提高装置。

如图所示，原双燃料供给系统有一汽油—LPG（或 CNG）转换开关 7，当发动机燃用气体燃料时，汽油电磁阀 19 关闭，所有的气体燃料电磁阀打开。利用 LPG 容器内的压力压出液态的石油气，通过过滤器滤除杂质，经过电磁阀 6 进入减压阀 8，在此减压、气化、调压（对 CNG 需要经过三级减压）后，成为具有一定压力的气体燃料，在混合器 12 里和空气混合后进入发动机燃烧室。

现在普遍使用的 LPG（或 CNG）—汽油双燃料发动机供气系统，使得发动机在燃用气体燃料时，动力下降显著，大大影响双燃料发动机汽车的行驶性能。共主要原因是：气体燃料比汽油要占据的体积大，相同发动机排量下，影响发动机的充量，以及气体燃料的体积热值低，燃烧速度慢等。

本实用新型的目的是提供一种结构简便可靠，使用它能使双燃料发动机燃气时的动力接近，甚至达到燃油时水平的双燃料汽油发动机燃气动力提高装置。

为了达到上述目的，本实用新型采取下列措施：

在原双燃料发动机汽油截断电磁阀上，并联一个控制汽油流量的电磁阀，同时在原发动机化油器节气门上，设置一个通断由化油器节气门的开度自动控制的，并用来控制电磁阀启闭的行程开关。

本实用新型的优点：结构简便可靠，使用它能使双燃料发动机燃气时的动力接近，甚至达到燃油时的水平，而不影响发动机燃气时的良好排放性能及经济性能指标。

下面结合附图作详细说明：

附图是车用双燃料供给装置结构示意图。

图中，加气口 1、组合阀 2、汽油箱 3、高压铜管 4、汽油滤清器 5、LPG 或 CNG 电磁阀 6、LPG/汽油转换开关 7、减压阀 8、水箱水管 9、三通 10、怠速器 11、混合器 12、燃气软管 13、化油器 14、真空管 15、节气门 16、发动机 17、汽油泵 18、汽油电磁阀 19、控制汽油流量电磁阀 20、栓塞型行程开关 21。

双燃料汽油发动机燃气动力提高装置，它在原双燃料发动机汽油截断电磁阀 19 上，并联一个控制汽油流量的电磁阀 20，同时在原发动机化油器 14 节气门 16 上，设置一个通断由化油器节气门的开度自动控制的，并用来控制电磁

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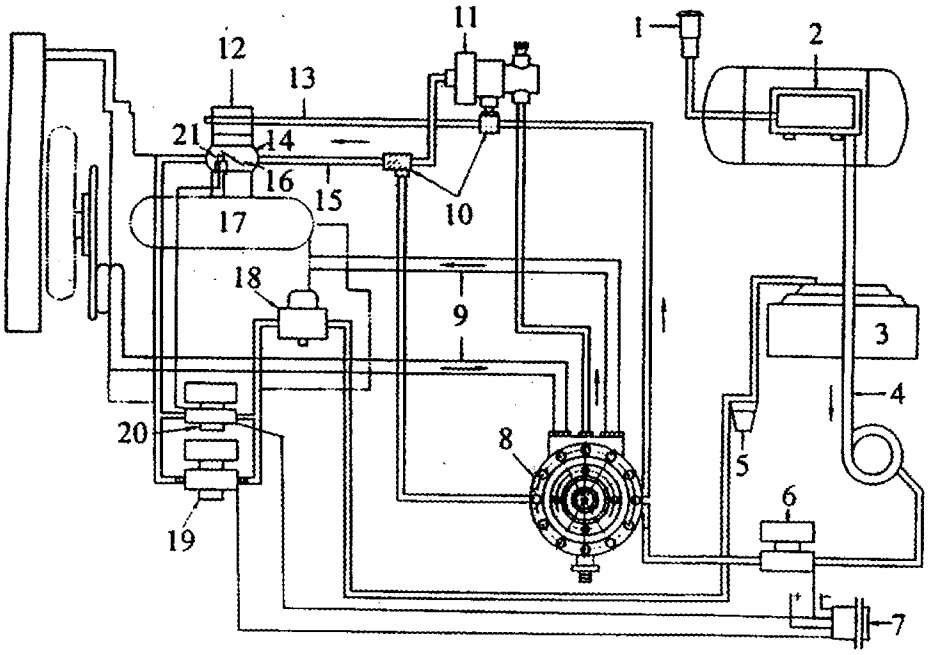
阀启闭的行程开关 21。控制汽油流量的电磁阀 20，其负极接到行程开关的活动端上，正极与电磁阀 6 的正极相连。行程开关 21 为柱塞型行程开关，该开关的活动端与控制汽油流量的电磁阀 20 的负极相连，固定端搭铁。

当发动机燃用气体燃料时，汽油电磁阀 19 关闭，所有的气体燃料电磁阀打开。利用 LPG 容器内的压力压出液态的石油气，通过过滤器滤除杂质，经过电磁阀 6 进入减压阀 8，在此减压、气化、调压（对 CNG 需要经过三级减压）后，成为具有一定压力的气体燃料，在混合器 12 里和空气混合后进入发动机燃烧室。本实用新型在汽油电磁阀 19 上并联一个常闭的控制汽油流量电磁阀 20，使得发动机在高速或大负荷时，可以有一小部分特定时的汽油通过该电磁阀，经化油器 14，进入发动机 17，实现两种燃料联供、燃气掺烧汽的目的，从而大大提高发动机燃气时的动力。而低负荷和怠速时，通过设置在化油器 14 上的一个行程开关 21，及时将这一小部分特定量的汽油切断。该行程开关的活动端与控制汽油流量电磁阀 20 的负极相连，固定端搭铁。行程开关的通断完全由节气门 16 控制。当节气门 16 开度变小到一定程度，即发动机过渡到低负荷或怠速时，触及行程开关的柱塞，使行程开关断开，控制汽油流量电磁阀 20 断电，额外汽油的供给切断，发动机 17 处于完全燃气状态；而高转速或大负荷时，节气门 16 开度变大，行程开关 21 自动导通，控制汽油流量电磁阀 20 通电导通，一小部分特定流量的汽油便通过该电磁阀进入发动机与燃气共烧，从而大大提高发动机的动力。

当发动机工作在燃油状态时，LPG（或 CNG）电磁阀 6 的正极没有电压，而控制汽油流量电磁阀 20 的正极是与 LPG（或 CNG）电磁阀 6 的正极相连的，所以控制汽油流量电磁阀 20 上也没有电流输入，不管节气门 16 上的特种行程开关 21 如何动作，控制汽油流量电磁阀 20 都不导通，这与原供给系统燃油时状况完全一致，对发动机燃油时的性能不会产生任何影响。

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说 明 书 附 图



Espacenet

Bibliographic data: GB189800 (A) — 1923-10-11

Improvements in or relating to internal combustion engines

Inventor(s):

Applicant(s): ARNOLD SONDEREGGER ± (ARNOLD SONDEREGGER)

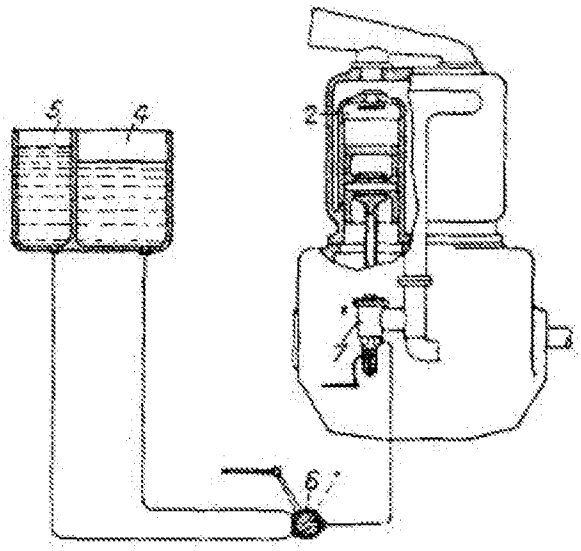
Classification: **- international:** ***F02M1/00***
- cooperative: **F02M1/00 (EP)**; F02M2700/4316 (EP)

Application number: GB19220032868 19221201

Priority number(s): CHX189800 19211202

Abstract of GB189800 (A)

189,800. Sonderegger, A. Dec. 2, 1921, [Convention date]. Spray carburettors - Either light fuel from the compartment 5 of the fuel tank, or a mixture of light and heavy fuel from the compartment 4, according to the position of the three-way cock 6, is supplied to the carburetting apparatus 7, the jet of which is adjustable and may be interconnected with the cock 6 to compensate automatically for the change of fuel. The light fuel may be petrol and it may be used with an equal quantity of naphtha or other raw oil.. Cylinders receiving liquid fuel.-Plates 2 for vaporizing the fuel are provided in the combustion space.



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PATENT SPECIFICATION

Convention Date (Switzerland): Dec. 2, 1921. **189,800**

Application Date (in United Kingdom): Dec. 1, 1922. No. 32,868/22.

Complete Accepted: Oct. 11, 1923.

COMPLETE SPECIFICATION.

Improvements in or relating to Internal Combustion Engines.

I, ARNOLD SONDEREGGER, of 30, Rotstrasse, Zurich, Switzerland, a citizen of the Swiss Conferation, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to internal combustion engines more especially for motor cars, the main object of the invention being to provide means whereby the engines can be run on liquid fuel of two different qualities, say ordinary petrol and petrol mixed with a heavier or cheaper fluid which latter would in an ordinary way not be suitable alone (although it may in some cases be used without the petrol) in conjunction with means for preheating.

The preheating means is of that kind in which hot plates or equivalents are arranged in the combustion chambers of the engine said heater being used also with the petrol if so desired.

Briefly the invention consists in providing a double tank having outlets to a valve through which the contents of either tank can be allowed to pass to the carburetter of the engine both the said valve and the carburetter being capable of adjustment to select the desired fuel and to suit the fuel selected.

A suitable valve is one having two inlets and one outlet and provided with a plug or the like by turning which either inlet can be put into communication with the outlet, or of course the valve can be closed. The valve and the variation or adjustment of the carburetter can be effected by suitable mechanism, say levers and links of the kind operated from the dash board of the engine of the vehicle to which the invention is applied.

By means of the device operating in accordance with the method above described it is possible with a constant or even increased efficiency of the engine to operate the engine by means of a mixture of petrol and raw oil, for example 50% raw naphtha, and thus to effect a considerable saving in working expenses, and to obtain an almost smokeless combustion. It is also possible when travelling through localities where there are restrictions as to the emission of the fumes of heavy oils, to operate the engine with petrol by changing over the supply of fuel to the carburetter so as to obviate the trouble which is caused by the exhaust gases from the mixtures of petrol and raw oil.

The heating body for heating the fuel is preferably of the kind which consists of heating plates which are secured in the interior of the cylinder head and which are of such dimensions that they do not heat the mixture right up to the ignition point.

In the accompanying drawing is shown by way of example a form of construction of the subject of the invention, the example being a two cylinder engine, one cylinder being shown in section whilst the fuel tank together with the piping connecting this with the engine and the change-over cock are shown diagrammatically.

In the compression space of the cylinder 1 are provided heating plates 2 which are secured in the interior of the cylinder head. These heating plates store a portion of the heat of combustion and thus heat the freshly incoming mixture to a high temperature below the ignition temperature, whereupon after the completion of the compression stroke the ignition is effected by the usual ignition plug. The two part fuel tank 3 contains in the compartment 4 a mixture of petrol and any kind of raw or heavy oil and in the com-

[Price 1/-]

partment 5 pure petrol. The fuel supply pipes of both compartments are connected by a single pipe by the change over cock 6, which is operated from the driver's seat by suitable link work and from which a pipe leads to the carburettor 7. The carburettor illustrated is an apparatus of the known type having an adjustable jet for the fuel and the opening thereof is controlled from the driver's seat by link-work. For changing over from petrol to the mixture and *vice versa* it suffices to operate the cock 6 and simultaneously to regulate the carburettor 7, these, for simplicity, being coupled together or even combined as a unit. The latter construction has the advantage that it is impossible to effect an incorrect adjustment. In the linkwork for the cock and for the carburettor adjusting mechanisms may be provided so as to enable a very fine adjustment to be made.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An internal combustion engine of the kind provided with heaters in the combustion chambers in combination with two fuel tanks connected to a valve so that the contents of either tank can be allowed to pass through the valve to the carburettor of the engine said carburettor being adjustable for use with different liquid fuels.

2. In combination with the engine having two fuel tanks and a valve according to Claim 1 means whereby the two tanks can be selectively connected to the carburettor of the engine and in which the carburetter can be adjusted to suit either fuel, the said selection and the said adjustment being made by suitable mechanism such as links and levers, substantially as herein described.

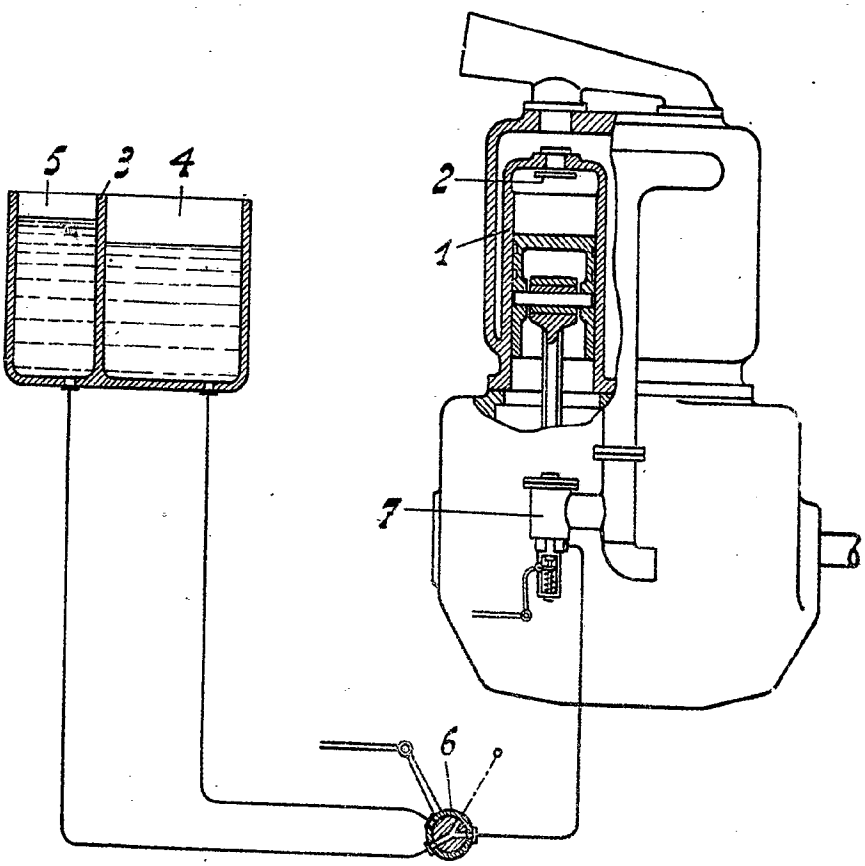
Dated this 1st day of December, 1922.

HY. FAIRBROTHER,
Chartered Patent Agent,
30 and 32, Ludgate Hill, London, E.C. 4.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1923.

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[This Drawing is a reproduction of the Original on a reduced scale]



Malby & Sons, Photo-Litho

Espacenet

Bibliographic data: GB532903 (A) — 1941-02-03

Improvements relating to fuel control mechanism for internal combustion engines using alternative fuels

Inventor(s):

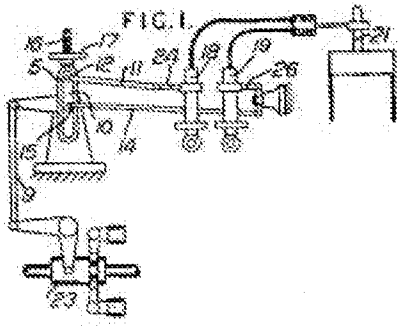
Applicant(s): ALEXANDER HENDERSON; FREDERICK ERNEST REBECK ± (ALEXANDER HENDERSON, ; FREDERICK ERNEST REBECK)

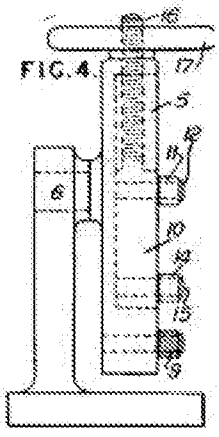
Classification: **- international:** ***F02D19/08; F02D19/10***
- cooperative: F02D19/0607 (EP); F02D19/0684 (EP); F02D19/08 (EP); F02D19/10 (EP); Y02T10/30 (EP)

Application number: GB19390026528 19390923

Priority number(s): GB19390026528 19390923

Abstract of GB532903 (A)





532,903. Regulating. HENDERSON, A., and REBBECK, F. E. Sept; 23, 1939, No. 26528. [Class 7 (vi)] The alternative supply of two fuels to an engine is regulated by means of a link 5 pivoted at 6 and in which slides a block 10 connected at 12, 15 to rods 11, 14 leading to the regulating- means of the two fuels, the block being adjustable along the link to vary the proportions of the two fuels. As shown in Fig; 1, the rods 11, 14 actuate the controlling-rods 24, 26 of two fuel pumps 18, 19 supplying an injector 21 or separate injectors ; but one of the fuel pumps may be replaced by a throttle valve in a pipe supplying gaseous fuel to the engine. The block 10 is adjusted by means of a screw 16 and hand-wheel 17, and is arranged so that when the block is at one end of the link 5 one of the rods 11 and 14 is inoperative, and when the block is at the other end of the link the other rod is inoperative ; in intermediate positions, both rods operate to adjust the supplies of both fuels. The link 5 may be connected by a link 9 to a hand control; or to an automatic regulator such as a speed governor 23. If one fuel is to be ignited by spark ignition, this may be automatically brought into operation when the block 10 is moved to its extreme position for supplying the fuel.

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PATENT SPECIFICATION

532,903

Application Date: Sept. 23, 1939. No. 26528/39.

Complete Specification Accepted: Feb. 3, 1941.

COMPLETE SPECIFICATION

Improvements relating to Fuel Control Mechanism for Internal Combustion Engines using Alternative Fuels

We, ALEXANDER HENDERSON, of 133, Marlborough Avenue, Broomhill, Glasgow, W.1, and FREDERICK ERNEST REEBECK, of Harland and Wolff, Limited, Queen's Island, Belfast, both British Subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improved mechanism for controlling the supply of fuel to the cylinders of internal combustion engines constructed for use with alternative fuels, which may be different liquid fuels, or liquid fuel and gaseous fuel, or liquid fuel and a mixture of liquid and gaseous fuel, such as, for example, compression - ignition internal combustion engines adapted to use alternative liquid fuels, or adapted for the alternative use of liquid fuel and gaseous fuel, with or without admixture of the gaseous fuel with liquid fuel to assist combustion.

The invention is concerned with an engine according to the preceding paragraph provided with two fuel supply devices, one for supplying one fuel and the other for separately supplying another fuel to the engine cylinder or cylinders, each fuel supply device being controlled by transmission members connected to a slide element slidable on an oscillatory link or like member adapted to be oscillated about a fixed pivotal axis, the amplitude of oscillation being variable to vary the movement of said transmission members and thus to vary the amount of fuel supplied to the engine without varying the proportions of the fuels, and the slide element being manually adjustable on the link to move one transmission member relatively to the other, thereby to vary the proportions of the fuels supplied by the two fuel supply devices. An engine conforming to the preceding statement is hereinafter referred to as an engine " of the character described ".

Such mechanism enables the change of fuel to be effected without stopping the engine and also provides for the control of the supply of both fuels at all times. It further provides a means whereby the amount of the charge of fuel supplied to the engine can be regulated either automatically by the engine speed governor or by actuation of a fuel supply regulator, while further providing control means for the control of the relative proportions of the two fuels when a mixture of fuels is supplied to the engine.

Heretofore an engine of the character described had the two transmission members connected one to each pump plunger of a pair of fuel pumps and the link carrying the adjustable slide element was oscillated by articulating it to the end of an eccentric rod reciprocated by an eccentric on a shaft driven by the engine; consequently a continuous oscillatory movement of constant amplitude was imparted to the link during the running of the engine, thus continuously reciprocating either or both of the transmission members and pump plungers to supply fuel to the engine; in order to vary the total amount of fuel supplied to the engine, the amplitude of oscillation of the link could be varied by varying the point of articulation of the link to the engine-driven eccentric rod either by hand or by means of a governor, without varying the proportions of the fuels supplied by the two pumps. To vary the proportions of the fuels, the strokes of the transmission members were varied relatively to one another by adjusting the slide element on the link in order to vary the pump strokes; alternatively, the transmission members were arranged to control by-pass passages in the pumps in order to vary the effective action of the pumps.

According to the present invention an engine of the character described has the oscillatory link or like member oscillated only by the movement of a regulating member and only when the latter is actuated by hand or by an engine speed governor or by a mechanically or electrically-controlled engine regulator, so that the oscillatory link or like member and the transmission members remain stationary at any constant engine speed. The invention is further characterized by the feature that the fuel supply is effected

[Pric

either through independently driven fuel pumps or through fuel supply pipes controlled by valves, the supply of fuel through said pumps or valves being varied by any movement of the said transmission members. If the engine is adapted for using liquid fuel and gaseous fuel alternatively, one of the transmission members will be operatively connected to the liquid fuel pump or other means for controlling the liquid fuel supply to the engine and the other transmission member will be operatively connected to the means for controlling the gaseous fuel supply to the engine.

The invention will be more clearly understood by reference to the accompanying drawings whereon Fig. 1 is a diagrammatic illustration of the application of one form of the invention to the control of alternative liquid fuel supplies to the fuel injection nozzle of an engine cylinder. Fig. 2 is a similarly diagrammatic illustration of another form of the invention for the control of alternative liquid and gaseous fuel supplies to an engine cylinder. Figs. 3 and 4 are views taken at right angles to one another showing a slightly modified form of linkage to a larger scale than Figs. 1 and 2.

Referring firstly to Figs. 3 and 4, the linkage there shown comprises a slotted link 5 at the back of which is a pin 6 for pivotally mounting the link 5 on a fixed bracket 7. The link 5 is pivotally attached at 8 to one end of an actuating rod 9. Slidable in the slot in the link 5 is a slide block 10. A rod 11 is attached by a pivot pin 12 to one end of the block 10 and a similar rod 14 is attached by a pivot pin 15 to the other end of the block, which is of such a length that, when the block is at either end of the slot in the link 5, one or other of the pivot pins 12 and 15 is in a neutral position on the link and is coaxial with the axis of the pin 6, which is the axis about which the link 5 is free to swivel on the bracket 7. The slide block 10 is attached to a screw-threaded spindle 16 upon which is fitted an internally screw-threaded hand wheel 17. It will be apparent that the hand wheel 17 serves to adjust the slide block in the link.

With the slide block in its lower extreme position shown in Figs. 3 and 4, any longitudinal movement of the actuating rod 9 will result in corresponding movement of the rod 14, but the rod 11 will remain motionless, since the pivot pin 12 is coaxial with the axis about which the link 5 is adapted to swivel. If the slide block 10 is moved upwards and locked in its other extreme position by rotation of the hand wheel 17 until the latter again abuts against the upper end of the link 5, the pivot pin 15 will be brought into the position in which it is coaxial with the axis about which the link swings; in this position, longitudinal movement of the actuating rod 9 will transmit no movement to the rod 14, while the rod 11 will move with the rod 9.

If the slide block 10 is moved to a position between the two extreme positions above-mentioned, the rod 9 will transmit motion to both rods 11 and 14 and the displacement of the rods 11 and 14 will depend upon the distances of their pivot pins 12 and 15 from the axis of swing of the link 5.

Fig. 1 of the drawings shows a somewhat similar linkage for controlling either or both of two alternative liquid fuels supplied by separate fuel pumps 18 and 19 through a non-return valve chest 20 to a fuel injection nozzle 21 arranged to inject fuel into the combustion space 22 of an internal combustion engine cylinder. In Fig. 1 the link 5, instead of being directly attached to an actuating rod 9 as in Figs. 1 and 2, has a lateral arm 5*a* to which the actuating rod 9 is attached and the latter is pivotally attached at its other end to and controlled by any known type of centrifugal engine speed governor 23. The rod 11 of the linkage is attached to a pump control rod 24 which controls the pump 18, and the rod 14 of the linkage is connected through the medium of a rocking arm 25 to a pump control rod 26 which controls the pump 19. The fuel-injection pumps 18 and 19 are driven in known manner from the engine, as by means of engine-driven cams 27.

Displacement of the governor 23, due to engine speed variation, will transmit motion through the rod 9 to the link 5 and from thence to either or both of the rods 11 and 14 according to the position of the slide block 10 in the link 5, and will thus control either or both of the liquid fuel pumps 18 and 19 to control the liquid fuel supply to the engine. In either extreme position of the slide block 10, one or other of the rods 11 and 14 will remain motionless, so that the fuel pump 18 or 19 to which it is connected will either supply no fuel to the valve chest 20 or only a predetermined minimum quantity, while the other rod 11 or 14 will be fully responsive to any movements of the rod 9 and will thus control the fuel pump supplying the whole or main fuel charge to the injection nozzle 21. In any intermediate position of the slide block 10, both rods 11 and 14 will move with the rod 9 and thus control the supply of fuel by both fuel pumps 18 and 19.

The fuel pumps 18 and 19 may supply fuel to two separate fuel injection nozzles

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in place of the single fuel nozzle 21.

Instead of operatively connecting the link 5 to an engine speed governor as in Fig. 1, the link 5 may be connected to any known form of hand regulator lever or to a mechanically or electrically controlled regulator. Fig. 2 shows the arm 5*a* of the link 5 connected by the rod 9 to a hand regulator lever 28; in this case the linkage is turned through 90 degrees so that the screw-threaded spindle 16 is horizontal instead of being vertical as in Figs. 1, 3 and 4. Fig. 2 also illustrates the invention applied to an engine adapted to use either liquid or gaseous fuel or both. In this case, the rod 11 of the linkage is connected to an arm 29 on the spindle of a throttle valve 30 in a gas supply pipe 31 which opens through a mixing chamber 32 and inlet valve 33 into the combustion space 22 of the engine cylinder, air for combustion being supplied to the mixing chamber 32 through an air inlet pipe 34. The rod 14 of the linkage is connected through a bell-crank lever 35 to a pump control rod 36 which controls an engine-driven liquid fuel pump 37 supplying liquid fuel to a fuel injection nozzle 38 arranged to inject liquid fuel into the engine cylinder.

In either of the arrangements shown in Figs. 1 and 2, displacement of the sliding block 10 can be effected by turning the hand wheel 17 without stopping the engine; it is thus possible to change over from one fuel to the other while the engine is running. Moreover, the supply of either or both fuels may be at all times under the control of the engine speed governor, if the linkage is governor-controlled, so that the total quantity of fuel supplied is automatically kept within predetermined limits by the action of the governor. Similarly, if the linkage is connected to an engine regulator, other than an automatic speed governor, the supply of either or both fuels will be under the control of the engine regulator and the total quantity of fuel supplied can be controlled by actuating the engine regulator by hand or by mechanical or electrical means. When the engine is running on a mixture of two fuels, the relative proportions of the two fuels can be manually controlled by turning the hand wheel 17 to adjust the position of the slide block 10.

It is to be understood that the screw-threaded spindle 16 and hand wheel 17 are given only as an example of a convenient means of adjusting the slide block 10, and that any other means of adjusting the slide block may be provided.

If it is desirable for one fuel to be ignited by electrical spark ignition, the slide block 10 may be arranged so that, when it is moved to its extreme position in which the fuel supplied requires electrical spark ignition, the slide block 10 will cause electrical spark ignition apparatus to come into operation, e.g. the slide block may actuate an electrical contact to complete an electrical ignition actuating circuit.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An internal combustion engine of the character described wherein the oscillatory link or like member is oscillated only by the movement of a regulating member and only when the latter is actuated by hand or by an engine speed governor or by a mechanically or electrically-controlled engine regulator, so that the oscillatory member and the transmission members remain stationary at any constant engine speed.

2. An engine as claimed in claim 1 in which the fuel supply is effected through independently driven fuel pumps or fuel supply pipes controlled by valves and the supply of fuel through said pumps or valves is varied by any movement of the transmission members.

3. An internal combustion engine according to claim 1 or 2 wherein the link or equivalent member oscillates about a fixed pivotal axis situated in the length of the link member, and the slide element is such that, in either extreme position, one of its pivotal connections to the transmission members is in a neutral position coinciding with the said pivotal axis.

4. An internal combustion engine according to claim 3 wherein the slide element is adjustable by means of a hand wheel and a screw-threaded rod, substantially as described.

5. In an internal combustion engine using alternative fuels, fuel control mechanism arranged and operating substantially as herein described with reference to the accompanying drawings.

Dated this 22nd day of September, 1939.

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10, Stafford Street, Edinburgh, 3.

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[This Drawing is a reproduction of the Original on a reduced scale.]

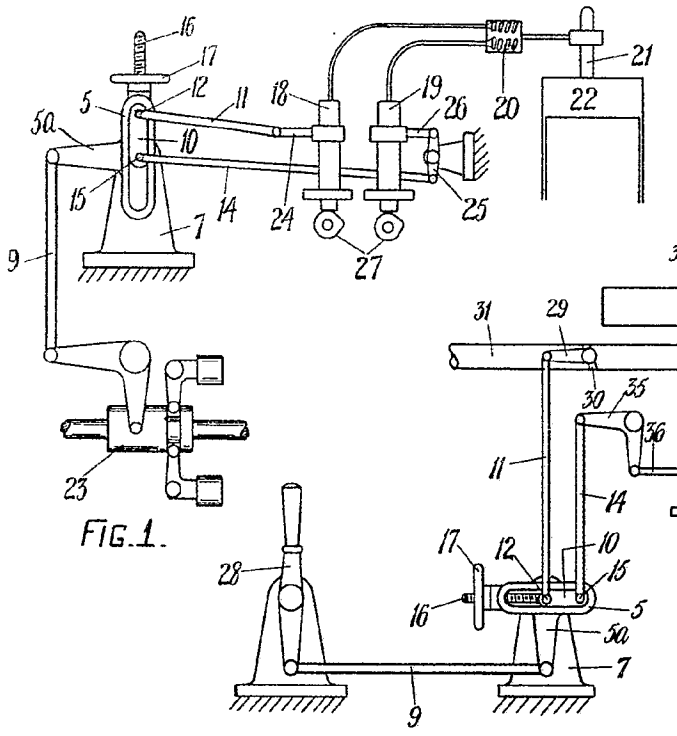


FIG. 1.

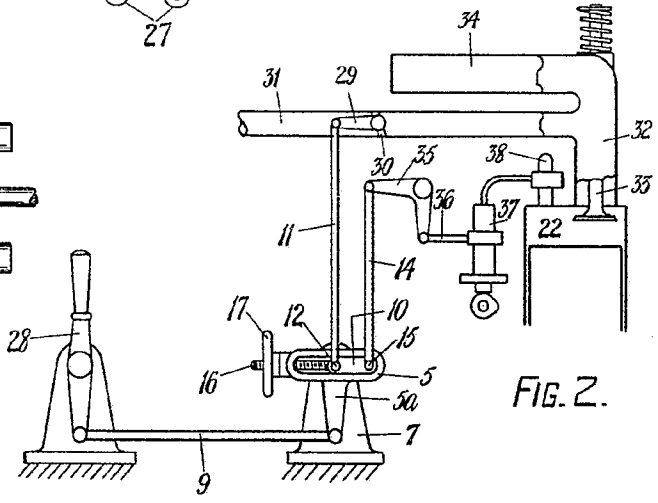


FIG. 2.

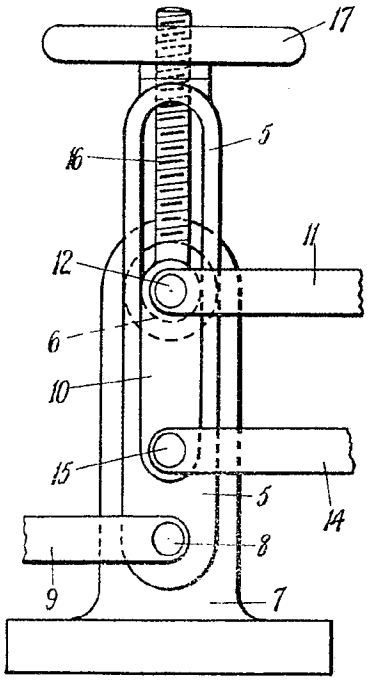


FIG. 3.

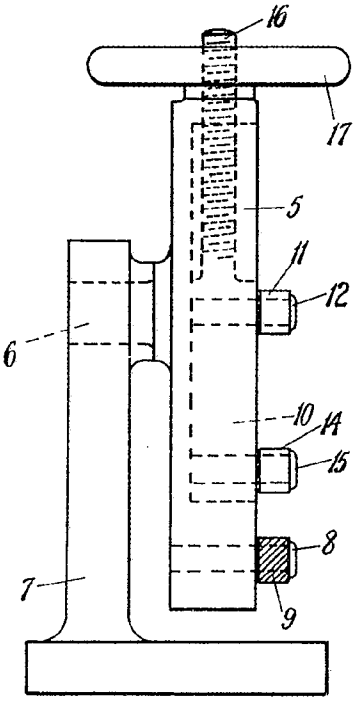


FIG. 4.

Malby & Sons, Photo-Lith.

Espacenet

Bibliographic data: DE102006008524 (A1) — 2006-08-31

Multi-way valve arrangement for use as fuel tank-change-over-valve, has valve device including two multi-way partial valves, which are symmetrical and co-operating with one another, where partial valves are designed as gate valves

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Classification: **- international:** ***F16K11/22***
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Application number: DE20061008524 20060222

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Abstract of DE102006008524 (A1)

The arrangement has valve device provided such that supply-tank connections (A1, B1) are alternatively connected with supply-engine connection (M1) and return-tank connections (A2, B2) are alternatively connected with return-engine connection (M2). The valve device includes a two multi-way partial valves (V1, V2), which are symmetrical and co-operating with one another. The partial valves are designed as gate valves.

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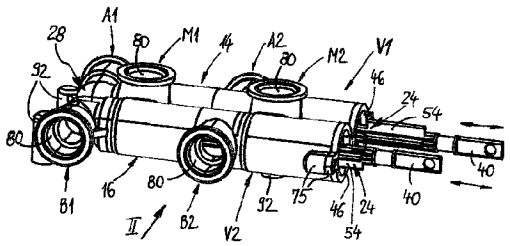
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Mehrwege-Ventilanordnung**

(57) Zusammenfassung: Die Erfindung betrifft eine Mehrwege-Ventilanordnung (1) zur Verwendung als Kraftstofftank-Umschaltventil zwischen mindestens zwei Kraftstofftanks (A, B) und einem Motor (M) in einem Kraftfahrzeug, mit mindestens zweimal zwei Tankanschlüssen (A1, A2; B1, B2) jeweils für Vorlauf und Rücklauf und zwei Motoranschlüssen (M1, M2) für Vorlauf und Rücklauf sowie mit einer Ventileinrichtung, derart, dass die Vorlauf-Tankanschlüsse (A1, B1) alternativ oder gemeinsam mit dem Vorlauf-Motoranschluss (M1) und die Rücklauf-Tankanschlüsse (A2, B2) alternativ oder gemeinsam mit dem Rücklauf-Motoranschluss (M2) verbindbar sind. Die Ventileinrichtung besteht aus mindestens zwei zusammenwirkenden, schalttechnisch symmetrischen Mehrwege-Teilventilen (V1, V2), insbesondere 4/2-Wege-Ventilen, die insbesondere als zusammenwirkende Schieberventile (14, 16) ausgebildet sind.



Beschreibung

[0001] Die vorliegende Erfindung betrifft eine Mehrwege-Ventilanordnung zur Verwendung als Kraftstofftank-Umschaltventil zwischen zwei Kraftstofftanks und einem Motor in einem Kraftfahrzeug, mit zweimal zwei Tankanschlüssen jeweils für Vorlauf und Rücklauf und zwei Motoranschlüssen für Vorlauf und Rücklauf sowie mit einer Ventileinrichtung derart, dass die Vorlauf-Tankanschlüsse alternativ oder gemeinsam mit dem Vorlauf-Motoranschluss und die Rücklauf-Tankanschlüsse alternativ oder gemeinsam mit dem Rücklauf-Motoranschluss verbindbar sind.

Stand der Technik

[0002] In bestimmten Regionen der Erde, beispielsweise in den U.S.A., werden im Fernverkehr mit Lastkraftwagen große Strecken zwischen Gebieten mit hohen Durchschnittstemperaturen und Gebieten mit sehr niedrigen Temperaturen zurückgelegt. Da LKW's üblicherweise mit Diesel-Kraftstoff betrieben werden, tritt dabei das Problem auf, dass "Normal-Diesel" bei etwa –15°C einfriert. Deshalb müssen Diesel-Fahrzeuge bei niedrigeren Temperaturen mit einem anderen, speziellen Kraftstoff betrieben werden, dem sogenannten "Arktic-Diesel", der auch bei Temperaturen bis –40°C noch flüssig bleibt. Arktic-Diesel ist allerdings um ca. 10 % bis 15 % teuerer als Normal-Diesel und verursacht zudem auch einen um etwa 10 % bis 15 % höheren Kraftstoff Verbrauch. Deshalb soll vermieden werden, das Fahrzeug nur, d. h. auch in wärmeren Regionen, mit Arktic-Diesel zu betreiben. Allerdings ist es nicht praktikabel und auch nicht rentabel, das gesamte Kraftstoffsystem mit Tanks) und Leitungen bei einem Wechsel zwischen warmen und kalten Regionen umzustellen, d. h. vollständig zu entleeren und neu zu befüllen.

[0003] Schwere LKW's sind heute üblicherweise mit (mindestens) zwei Kraftstofftanks ausgerüstet. Daraus ergibt sich die Möglichkeit, je nach Einsatzfall die Tanks mit gleicher oder unterschiedlicher Kraftstoffart zu betanken. Mit Hilfe einer Ventilanordnung der eingangs beschriebenen Art können dann die Tanks einzeln oder gemeinsam mit dem Motor verbunden werden.

[0004] Eine bekannte Ventilanordnung der genannten, gattungsgemäßen Art ist als Mehrfachventil aus Metall ausgebildet und besteht aus vielen miteinander verschraubten Einzelteilen, und zwar aus vier 2/2-Wege-Ventilen, die über zwei T-Verteiler verbunden sind. Jedes Einzelventil ist als Kugelventil ausgebildet und wird mechanisch über Zug/Schub-Stangen bedient. Dabei treten einige bedeutende Nachteile auf:

- lange Betätigungswege der Hebel-Gestänge (150 bis 160 mm)
- hohes Gewicht (ca. 2, 5 kg)
- verschraubte Anschlüsse sind nicht oder nur schwer richtungsverstellbar (bezüglich der Verlaufsrichtung von angeschlossenen Leitungen)
- hoher Material- und Montageaufwand
- hohe Betätigungskraft
- nur direkte manuelle Betätigung möglich, wozu der Fahrer anhalten und das Führerhaus verlassen muß.

Aufgabenstellung

[0005] Der vorliegenden Erfindung liegt die Aufgabe zugrunde, eine zur Vermeidung der beschriebenen Nachteile verbesserte Mehrwege-Ventilanordnung der genannten Art zu schaffen, die sich insbesondere durch reduzierten Material- und Montageaufwand, geringes Gewicht und geringe Betätigungskraft mit der daraus resultierenden Möglichkeit einer automatischen (Fern-) Betätigung auszeichnet.

[0006] Erfindungsgemäß wird dies durch die Merkmale des Anspruchs 1 erreicht. Vorteilhafte Ausgestaltungen der Erfindung sind in den abhängigen Ansprüchen enthalten.

[0007] Demnach besteht die Ventileinrichtung erfindungsgemäß aus (mindestens) zwei schaltungstechnisch bezüglich der vorhandenen Anschlüsse symmetrischen Teilventilen, die insbesondere als 4/2-Wege-Ventile beliebiger Bauart, bevorzugt aber als Schieberventile ausgebildet sind. Somit handelt es sich vorzugsweise um ein Doppel-Schieberventil mit zwei zusammenwirkenden Schieberventilen. Dies stellt eine kostengünstige Lösung dar, die mit minimalem Aufwand alle Funktionen der bekannten Ventilanordnung erfüllt, dabei aber aus sehr wenigen Einzelkomponenten besteht. Daraus resultiert auch ein geringer Herstellungs- und Montageaufwand. Der Einsatz von Schieberventilen ist auch bezüglich der Durchflusseigenschaften sehr vorteilhaft, weil große Strömungsquerschnitte realisiert werden können. So müssen keine Dichtungen umströmt werden, so dass die Strömungsquerschnitte innerhalb der Ventilanordnung sogar um etwa 20 % größer sein können, als in den angeschlossenen Leitungen, und dies sogar ohne größere Einbaumaße der Ventilanordnung. Die zur Betätigung notwendigen Schaltwege können kleiner als 30 mm gehalten werden.

[0008] Die Betätigungskräfte sind derart gering, dass auch ein Schalten mit automatischen Mitteln, insbesondere elektromagnetisch oder pneumatisch, möglich ist. Zudem kann gegenüber der bekannten Ausführung eine Gewichtsreduzierung von mindestens 50 % (bei manueller Betätigung) bzw. von mindestens 20 % (bei automatischer Betätigung) erreicht werden. Schließlich können alle Anschlüsse auf recht einfache Weise, insbesondere durch Verwendung von Steckverbindungen, richtungseinstellbar, ausgelegt sein.

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[0009] Jedes Teilventil weist zwei Tankanschlüsse für Vor- und Rücklauf und zwei Motoranschlüsse für Vor- und Rücklauf auf, wobei die Vorlauf-Motoranschlüsse der Teilventile miteinander zu einem gemeinsamen Vorlauf-Motoranschluss sowie die Rücklauf-Motoranschlüsse der Teilventile miteinander zu einem gemeinsamen Rücklauf-Motoranschluss verbunden sind.

[0010] Es sei an dieser Stelle bemerkt, dass das bevorzugte Doppel-Schieberventil grundsätzlich auch unabhängig von der speziellen Anwendung eingesetzt werden kann, und zwar als 6/3- bzw. 6/4-Wege-Ventil.

Ausführungsbeispiel

[0011] Anhand von in der Zeichnung veranschaulichten, bevorzugten Ausführungsbeispielen soll die Erfindung genauer erläutert werden. Dabei zeigen:

[0012] Fig. 1 eine Perspektivansicht einer erfindungsgemäßen Ventilanordnung (ohne endseitige Deckelelemente),

[0013] Fig. 2 eine Seitenansicht der Ventilanordnung in Pfeilrichtung II gemäß Fig. 1,

[0014] Fig. 3 einen Axialschnitt in der Ebene III-III gemäß Fig. 2,

[0015] Fig. 4 einen weiteren Axialschnitt in der zur Ansicht nach Fig. 3 senkrechten Schnittebene IV-IV gemäß Fig. 3,

[0016] Fig. 5 eine Ausschnittvergrößerung des Bereichs V in Fig. 4,

[0017] Fig. 6 eine vergrößerte Ansicht eines Deckelelementes in Pfeilrichtung VI gemäß Fig. 7,

[0018] Fig. 7 einen Schnitt in der Ebene VII-VII in Fig. 6,

[0019] Fig. 8 eine teilweise geschnittene Seitenansicht eines Einzelteils, und zwar eines Schiebers, der erfindungsgemäßen Ventilanordnung,

[0020] Fig. 9 einen Querschnitt in der Ebene IX-IX gemäß Fig. 8,

[0021] Fig. 10 bis Fig. 13 Darstellungen analog zu Fig. 3 in verschiedenen Schaltstellungen der erfindungsgemäßen Ventilanordnung,

[0022] Fig. 14 eine Seitenansicht der Ventilanordnung in einer vorteilhaften Ausgestaltung mit einer Druckmittel-Betätigungseinrichtung,

[0023] Fig. 15 einen Axialschnitt in der Ebene XV-XV in Fig. 14,

[0024] Fig. 16 eine vergrößerte Darstellung des Bereichs XVI der Betätigungseinrichtung in Fig. 15,

[0025] Fig. 17 eine vergrößerte Axialschnittansicht eines Einzelteils, und zwar eines Betätigungskolbens, der Betätigungseinrichtung gemäß Fig. 15 bzw. Fig. 16,

[0026] Fig. 18 eine Stirnansicht des Betätigungskolbens in Pfeilrichtung XVIII gemäß Fig. 17,

[0027] Fig. 19 eine Seitenansicht in Pfeilrichtung XIX in Fig. 18,

[0028] Fig. 20 einen weiteren Axialschnitt in der Ebene XX-XX in Fig. 18,

[0029] Fig. 21 eine weitere Ansicht eines Deckelelementes in einer gegenüber Fig. 6 alternativen Ausführung,

[0030] Fig. 22 einen Teilschnitt der Ventilanordnung entsprechend der Schnittlinie XII-XII in Fig. 15 mit zusätzlicher Darstellung von Anschlußsteckern und

[0031] Fig. 23 ein vereinfachtes Schaltbild der erfindungsgemäßen Ventilanordnung als Umschaltventil zwischen zwei Kraftstofftanks und einem Motor, beispielhaft in einer Schaltstellung wie in Fig. 13.

[0032] In den verschiedenen Figuren der Zeichnung sind gleiche Teile stets mit den gleichen Bezugszeichen versehen.

[0033] Wie sich zunächst aus Fig. 23 ergibt, wird eine erfindungsgemäße Mehrwege-Ventilanordnung **1** insbesondere als Kraftstofftank-Umschaltventil zwischen zwei Kraftstofftanks A und B und einem nur schematisch angedeuteten Motor M in einem Kraftfahrzeug (LKW) eingesetzt. Die Ventilanordnung **1** weist dazu zweimal zwei Tankanschlüsse A1, A2 für den Tank A und B1, B2 für den Tank B auf, wobei die Anschlüsse A1 und B1 als Vorlauf-Tankanschlüsse für je eine vom Tank A bzw. B zur Ventilanordnung **1** führende Tank-Saugleitung **2**, **4** und die Anschlüsse A2 und B2 als Rücklauf-Tankanschlüsse für je eine zurück in Richtung Tank A bzw. B führende Rücklaufleitung **6**, **8** fungieren. Ferner weist die Ventilanordnung **1** zwei Motoranschlüsse M1 und M2 auf, wobei der Anschluss M1 als Vorlauf-Motoranschluss für eine zum Motor M führende Vorlaufleitung **10** und der Anschluss M2 als Rücklauf-Motoranschluss für eine vom Motor M kommende Rücklaufleitung **12** vorgesehen sind. Die Ventilanordnung **1** weist weiterhin eine Ventileinrichtung derart auf, dass die Vorlauf-Tankanschlüsse A1, B1 alternativ oder gemeinsam mit dem Vorlauf-Motoranschluss M1 und die Rücklauf-Tankanschlüsse A2, B2 alternativ oder ge-

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meinsam mit dem Rücklauf-Motoranschluss M2 verbindbar sind. Dadurch kann alternativ entweder der Tank A oder der Tank B mit dem Motor verbunden werden, oder es können beide Tanks A und B parallel mit dem Motor verbunden werden. Vorzugsweise ist noch eine vierte Schaltstellung vorgesehen, wobei beide Tanks A und B vom Motor M getrennt, d. h. abgesperrt sind. Diese vierte Schaftstellung (siehe Fig. 10) kann beispielsweise – durch eine geeignete Steuerung betätigt – den Kraftstoff zwangsweise absperren, um als Wegfahrsperre zu dienen oder als Sicherheitsventil bei einem Unfall einen ungewollten Kraftstoffaustritt aus beschädigten Leitungen oder Aggregaten zu verhindern. In Fig. 23 ist beispielhaft die Schaltstellung dargestellt, wobei der Tank B mit dem Motor M verbunden ist, während der andere Tank A abgesperrt ist. Zu den anderen Schaltstellungen wird bereits an dieser Stelle auf die Fig. 10 bis Fig. 13 verwiesen.

[0034] Erfindungsgemäß besteht nun die Ventileinrichtung **1** aus zwei zusammenwirkenden, Mehrwege-Teilventilen V1, V2, insbesondere Schieberventilen **14** und **16**. Jedes Teilventil V1, V2 bzw. Schieberventil **14**, **16** ist als 4/2-Wege-Ventil ausgebildet und weist zwei der Tankanschlüsse, und zwar einerseits A1 und A2 und andererseits B1 und B2, für Vor- und Rücklauf auf. Die Motoranschlüsse M1 und M2 sind mit beiden Schieberventilen **14**, **16** verbunden. Daraus resultiert insgesamt ein Aufbau als 6/3- oder 6/4-Wege-Ventil mit sechs Anschlüssen und mindestens drei, vorzugsweise vier Schaltstellungen.

[0035] Jedes Schieberventil **14**, **16** weist ein Ventilgehäuse **18** und einen in einem länglichen, zylinderartigen Schieberraum **20** innerhalb des Ventilgehäuses **18** in Richtung einer Schieberachse **22** kolbenartig zwischen (mindestens) zwei Schaltstellungen längsverschiebbaren Schieber **24** auf (vgl. hierzu auch die gesonderte Darstellung in Fig. 8). Jeder Schieberraum **20** weist an axial, d. h. in Richtung der Schieberachse **22** versetzten Stellen vier Steueröffnungen **26** auf, die jeweils mit einem der Tankanschlüsse A1, A2 bzw. B1, B2 bzw. einem der Motoranschlüsse M1 bzw. M2 verbunden sind. Je nach Stellung der Schieber **24** können die Steueröffnungen **26** paarweise verbunden oder gegeneinander abgesperrt werden.

[0036] In der bevorzugten Ausführung sind die zwei Schieberventile **14**, **16** direkt benachbart und bezüglich ihrer Schieberachsen **22** parallel zueinander angeordnet. In weiterer vorteilhafter Ausgestaltung sind dabei die beiden Ventilgehäuse **18** zu einem monolithisch einstückigen Gehäuse-Formteil **28** zusammengefasst. Dieses Formteil **28** ist insbesondere als Kunststoff-Spritzteil oder als Druckgussteil beispielsweise aus Aluminium oder Zink ausgebildet. Auch dies trägt zu einer wirtschaftlichen Herstellung bei. Grundsätzlich kann aber das Formteil **28** auch aus Vollmaterial durch eine spanende Bearbeitung hergestellt werden.

[0037] Das einstückige Gehäuse-Formteil **28** mit den beiden Ventilgehäusen **18** ist bezüglich einer mittigen Symmetrieebene **30** spiegelsymmetrisch ausgebildet. Dabei erstrecken sich die Tankanschlüsse A1, A2 und B1 und B2 jeweils mit zur Symmetrieebene **30** paralleler oder senkrechter Verlaufsrichtung von dieser weg nach außen. Die Motoranschlüsse M1, M2 sind mittig mit einer der Symmetrieebene **30** entsprechenden Verlaufsrichtung angeordnet. Somit liegen die Motoranschlüsse M1, M2 mittig zwischen den beiden Schieberventilen **14**, **16**. Jeder Motoranschluss M1, M2 geht in einen Kanal über, der zur Bildung der zugehörigen Steueröffnungen **26** die Schieberräume **20** beider Schieberventile **14**, **16** anschneidet. Dadurch sind auf einfache Weise die Motoranschlüsse M1, M2 mit beiden Schieberventilen **14** und **16** verbunden.

[0038] Jeder Schieber **24** weist an axial beabstandeten Stellen Umfangsdichtungen **32** auf, die mit inneren Dichtflächen des jeweiligen Ventilgehäuses **18** zusammenwirken. Dabei besteht jeder Schieber **24** – siehe insbesondere Fig. 8 – aus einem zentrischen, axialen Kern **36** und mehreren, in der dargestellten Ausführung vier, radialen tellerartigen Ventilscheiben **38** sowie einem einseitig aus dem jeweiligen Ventilgehäuse **18** nach außen geführten Betätigungsende **40**. Jede Ventilscheibe **38** trägt auf ihrem Außenumfang vorzugsweise in einer Ringnut **42** eine der Umfangsdichtungen **32**. Die Umfangsdichtungen **32** können von elastischen O-Ringen gebildet sein. Gemäß Fig. 8 ist es vorteilhaft, wenn die Ventilscheiben **38** im Bereich radial zwischen dem Kern **36** und dem äußeren Umfang axiale Hinterschneidungen **44** aufweisen. Bei einer bevorzugten Herstellung der Schieber **24** als einstückige Kunststoff-Formteile werden durch die Hinterschneidungen **44** vorteilhafterweise Materialanhäufungen und damit ein Verzug vermieden. Diese Hinterschneidungen **44** werden bei der Fertigung durch eine sogenannte Springkerntechnik entformt.

[0039] In weiterer vorteilhafter Ausgestaltung der Erfindung ist hierbei vorgesehen, dass die Umfangsdichtungen **32** bezüglich ihrer Außendurchmesser D1, D2, D3 (siehe hierzu Fig. 8) sowie die Dichtflächen **34** bezüglich ihrer Innendurchmesser D'1, D'2 und D'3 (siehe Fig. 4) in Anpassung aneinander derart ausgelegt sind, dass jede Umfangsdichtung **32**, die sich bei einem Schaltvorgang axial über den Bereich einer der Steueröffnungen **26** hinweg bewegt (im dargestellten Beispiel sind dies die Dichtungen **32b** und **32d**; siehe Fig. 4 und Fig. 8), in ihrem sich axial über die jeweilige Steueröffnungen **26** hinweg erstreckenden Bewegungsbereich radial im Wesentlichen unverpresst ist und erst in einem jeweils axial zwischen zwei voneinander zu trennenden Steueröffnungen **26** liegenden Dichtbereich radial verpresst

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wird. Durch diese vorteilhafte Maßnahme wird vermieden, dass eine der Umfangsdichtungen **32** bei ihrer Bewegung über eine seitlich in den Schieberraum **20** mündende Steueröffnung **26** hinweg beschädigt werden könnte, denn in einem verpressten Zustand könnte sich die Dichtung in die Steueröffnung **26** hinein ausdehnen und bei der weiteren Bewegung am Öffnungsrand hängenbleiben und so beschädigt werden. Dies wird durch die erfindungsgemäße Maßnahme vermieden. Konkret ist bei der bevorzugten Ausführung vorgesehen, dass der Schieberraum **20** jedes Ventilgehäuses **18** ausgehend von einem für das Betätigungsende **40** des Schiebers **24** offenen Ende **46** mehrere axial über konische Übergänge **48** ineinander übergehende, im Wesentlichen zylindrische Dichtflächen **34a** bis c aufweist, deren Innendurchmesser D'1 bis D'3 sich sukzessive über die konischen Übergänge **48** verkleinern (siehe nochmals Fig. 4). Es sei bemerkt, dass die Dichtflächen **34** auch jeweils schwach konisch, d. h. mit einem kleinen Konuswinkel ≤ 1°, ausgebildet sein können. Dies ermöglicht eine vereinfachte Entformbarkeit bei der Herstellung als Spritz- oder Druckgussteil. Die Auslegung der Durchmesser muss dabei in Relation zu den zugehörigen Umfangsdichtungen natürlich so sein, dass jede Umfangsdichtung **32** in ihrer Dichtstellung im Bereich der zugehörigen Dichtfläche **34** eine sichere Abdichtung gewährleistet. Was den Schieber **24** betrifft (siehe Fig. 8), so weist die – ausgehend vom Betätigungsende **40** – erste Umfangsdichtung **32a** einen Durchmesser D1 auf, der an den Innendurchmesser D'1 der ersten Dichtfläche **34a** so angepasst ist, dass diese Umfangsdichtung **32a** zur Abdichtung verpresst ist. Damit dient diese erste Umfangsdichtung **32a** zur ständigen Abdichtung des Schieberraums **20** nach außen in Richtung des offenen Endes **46**. Die nächste, zweite Umfangsdichtung **32b** weist demgegenüber einen reduzierten Durchmesser D2 auf, so dass diese zweite Umfangsdichtung **32b** im Bereich der ersten Dichtfläche **34a** nicht oder zumindest nicht vollständig radial verpresst ist. Dadurch kann sie sich über den Bereich der ersten Steueröffnung **26** hinweg schadlos bewegen. Im Anschluss daran wird diese zweite Umfangsdichtung **32b** über den konischen Übergang **48** radial verpresst, bis sie dann dichtend auf der zweiten Dichtfläche **34b** mit dem Innendurchmesser D'2 anliegt. In analoger Weise verhält sich dies auch mit der dritten und vierten Umfangsdichtung **32**. So liegt die dritte Umfangsdichtung **32c** in jeder Stellung radial verpresst und dadurch dichtend an der Dichtfläche **34b** an. Ihr Durchmesser D2 entspricht demgemäß etwa dem Innendurchmesser D'2. Die vierte und letzte Umfangsdichtung **32d** weist einen weiter reduzierten Durchmesser D3 auf, so dass sie folglich im Bereich dieser Dichtfläche **34b** mit dem Innendurchmesser D'2 nicht oder nur unwesentlich radial verpresst ist. Sie kann sich dadurch über den Bereich der weiteren Steueröffnung **26** schadlos hinweg bewegen und wird dann über den weiteren konischen Übergang **48** radial verpresst, und zwar entsprechend dem Innendurchmesser D'3 der sich anschließenden Dichtfläche **34c**.

[0040] Es ist zweckmäßig, wenn die Ventilgehäuse **18** an ihren offenen Enden **46** mit einem Deckelelement **50** verschlossen bzw. verschließbar sind. Vorzugsweise dient das Deckelelement **50** auch zur Führung des Betätigungsendes **40** des jeweiligen Schiebers **24**. Dazu weist das Deckelelement **50** jeweils eine Führungsöffnung **52** mit einer dem Querschnitt des Kerns **36** bzw. eines zusätzlichen Führungsabschnittes **54** entsprechenden Öffnungskontur auf. Im dargestellten Beispiel handelt es sich um einen von der Kreisform abweichenden, insbesondere etwa kreuzförmigen Querschnitt, siehe insbesondere Fig. 6, so dass auch eine Führung gegen Verdrehen um die Schieberachse **22** erreicht wird. Durch eine spezielle, insbesondere gegeneinander „verdrehte" Anordnung der Führungsöffnungen **52** (vgl. Fig. 6 und Fig. 21) wird eine definierte Einbaulage der Schieber **24** zur Korrektur von eventuellen, herstellungsbedingten Formabweichungen im Gehäuse **18** erreicht. Hierzu kann der Schieber **24** in der Form dem Gehäuse und dessen Formabweichung angepasst werden. Es ist dabei zudem vorteilhaft, wenn die einzelnen Deckelelemente **50** der beiden Ventilgehäuse **18** über einen Verbindungsabschnitt **56** zu einem einstückigen Teil, insbesondere einem einstückigen Kunststoff-Formteil, zusammengefasst sind.

[0041] In weiterer bevorzugter Ausgestaltung ist jeder Schieber **24** in jeder von zwei Schaltstellungen insbesondere über Rastmittel **58** kraftformschlüssig fixiert. Wie sich insbesondere aus Fig. 5 ergibt, kann als Rastmittel **58** jeweils ein Rastarm **60** im Bereich der Führungsöffnung **52** des Deckelelementes **50** vorgesehen sein, der mit einer Rastnase jeweils in eine Rastausnehmung **62** des Schiebers **24** bzw. des Führungsabschnittes **54** eingreift.

[0042] Wie nur in Fig. 3 stark schematisch angedeutet ist, ist es weiterhin vorteilhaft, wenn zur Schmutzabdichtung zwischen dem Betätigungsende **40** jedes Schiebers **24** und dem Ventilgehäuse **18** bzw. dem damit verbundenen Deckelelement **50** eine faltenbalgartig längenvariable Hülle **64** angeordnet ist.

[0043] In den Ausführungen gemäß Fig. 1 bis Fig. 13 sind die Schieber **24** manuell, insbesondere über nicht dargestellte mechanische Verbindungen, wie Gestänge oder Seilzüge, betätigbar.

[0044] Alternativ oder auch zusätzlich kann eine Betätigungseinrichtung **66** zur motorischen, insbesondere pneumatischen oder hydraulischen oder elektromagnetischen Betätigung der Schieber **24** vorgesehen sein.

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[0045] Hierzu wird auf das Ausführungsbeispiel gemäß Fig. 14 bis Fig. 16 verwiesen, wobei die Ventilgehäuse **18** auf der Seite der Betätigungsenden **40** der Schieber **24** – vorzugsweise zusätzlich zu dem Deckelelement **50** – mit jeweils einem Zylindergehäuse **68** verbunden sind. Die Schieber-Betätigungsenden **40** sind mit jeweils einem in dem Zylindergehäuse **68** geführten Betätigungskolben **70** verbunden. Jedes Zylindergehäuse **68** weist einen Steuerdruckanschluß S1 bzw. S2 auf. Dadurch kann der jeweilige Betätigungskolben **70** auf der Seite eines Arbeitsraums **71** mit einem Druckmittel beaufschlagt werden, um den zugehörigen Schieber **24** insbesondere gegen die Rückstellkraft einer Rückstellfeder **72** zu verschieben. Vorzugsweise ist dabei jeder Betätigungskolben **70** über Rastmittel **74** mit dem Betätigungsende **40** des zugehörigen Schiebers **24** verbunden. Hierzu wird auch auf die gesonderten Darstellungen des Betätigungskolbens **70** in Fig. 17 bis Fig. 20 hingewiesen. Um auf der dem Arbeitsraum **71** gegenüberliegenden Seite des Betätigungskolbens **70** bei der Druck-Betätigung innerhalb des Zylindergehäuses **68** einen Überdruck zu vermeiden bzw. abzubauen, weist das/jedes Zylindergehäuse **68** in diesem Bereich (mindestens) eine Lüftungsöffnung **67** auf, die vorzugsweise außen von einer membranventilartigen, ringbandförmigen Schmutzdichtung **69** überdeckt ist (siehe insbesondere Fig. 16).

[0046] Weiterhin ist es vorteilhaft, wenn die beiden Zylindergehäuse **68** der Betätigungseinrichtung **66** zu einem einstückigen Formteil zusammengefasst sind. Dieses Zylinder-Formteil wird bevorzugt im Bereich von seitlichen Montageansätzen **75** mit dem Gehäuse-Formteil **28** verschraubt, und zwar unter Zwischenlage des einteiligen Deckelelementes **50**. Dieses weist dann gemäß Fig. 21 korrespondierende Montageansätzen **75** mit Schraubenlöchern **76** auf. Zur Positionierung und Montagehilfe sind bevorzugt im Anlagebereich zwischen der Betätigungseinrichtung **66** und dem Deckelelement **50** sowie zwischen letzterem und dem Gehäuse **18** bzw. dem Gehäuse-Formteil **28** Positionsansätze **77** vorgesehen, die in korrespondierende Öffnungen eingreifen (siehe insbesondere Fig. 16). Durch eine unterschiedliche Anordnung und/oder Form, z.B. unterschiedliche Durchmesser, der Positionseinsätze **77** können die Teile nur korrekt und lagerichtig miteinander verbunden werden, so dass vorteilhafterweise eine Fehlmontage praktisch ausgeschlossen ist.

[0047] Bei der Alternative gemäß Fig. 2 bis Fig. 13 ist das Deckelelement **50** gemäß Fig. 6 über Rastmittel **78** mit den Ventilgehäusen **18** bzw. dem Gehäuse-Formteil **28** verrastbar.

[0048] Dabei kann auch die Betätigungseinrichtung **66** über Rastmittel befestigt werden (nicht dargestellt).

[0049] Es ist weiterhin zweckmäßig, wenn alle vorgesehenen Anschlüsse A1/2, B1/2, M1/2 und S1/2 als Kupplungsteile zum insbesondere richtungsvariablen Steckanschluss von Leitungen ausgebildet sind. Hierzu wird auf Fig. 22 verwiesen, wonach jeder Anschluss als muffenartige Aufnahmeöffnung **80** zum Einstecken eines Steckerteils **82** ausgebildet ist. Dabei sind zudem geeignete Arretiermittel **84** zum lösbaren Arretieren des eingesteckten Steckerteils **82** vorgesehen. Im dargestellten Beispiel weist jeder Anschluss im Mündungsbereich der Aufnahmeöffnung **80** einen radial nach außen ragenden Umfangsrand **86** auf, der im eingesteckten Zustand von äußeren, sich axial erstreckenden Rastarmen **88** des jeweiligen Steckerteils **82** rastend übergriffen wird. Zum Lösen können die Rastarme **88** radial nach außen gespreizt werden. Vorteil dieser Anschlussart ist, dass die Verlaufsrichtung der angeschlossenen Leitung (selbst nicht dargestellt) variabel ist, weil sich die Steckerteile **82** relativ zu den Anschlüssen verdrehen lassen. Im dargestellten Beispiel gemäß Fig. 22 weist jedes Steckerteil 82 zum Leitungsanschluss einen üblichen Anschlussdorn **90** auf.

[0050] Die Bestandteile der erfindungsgemäßen Ventilanordnung **1**, und zwar insbesondere die Ventilgehäuse **18** bzw. das einstückige Gehäuse-Formteil **28**, die Schieber **24** und vorzugsweise auch die Deckelelemente **50** und optional die Zylindergehäuse **68** und die Betätigungskolben **70**, bestehen vorzugsweise aus dem gleichen Material, und zwar insbesondere aus einem faserverstärkten Kunststoff, wie PA12-GF50. Dieses bevorzugte Material weist eine geringe Wasseraufnahme auf und eignet sich gut zur Anwendung mit Kraftstoffen, insbesondere Diesel. Durch Verwendung von gleichen Materialien für die Bestandteile werden Undichtigkeiten, die durch thermische Dehnung entstehen könnten, vermieden.

[0051] Das Gehäuse-Formteil **28** weist zur Montagebefestigung an einem nicht dargestellten Träger in einem Kraftfahrzeug mindestens zwei, bevorzugt drei außen angeformte Befestigungselemente **92** auf, die insbesondere derart gegenüber den Bereichen der Dichtflächen **34** axial und/oder radial versetzt angeordnet sind, dass bei der Montage ein Verzug des Formteils und daraus resultierende Formveränderungen im Bereich der Dichtflächen **34** weitgehend ausgeschlossen sind. Dies gewährleistet eine gute Funktionsfähigkeit und dauerhafte Dichtwirkung im Bereich der Umfangsdichtungen **32** und Dichtflächen **34**.

[0052] Die Funktion der erfindungsgemäßen Ventilanordnung **1** dürfte durch die obigen Erläuterungen des konstruktiven Aufbaus bereits hinreichend klar sein. Ergänzend wird auf die Darstellungen in den Fig. 10 bis Fig. 13 verwiesen. In Fig. 10 ist eine optionale Absperrstellung dargestellt, in der alle vorhandenen Anschlüsse voneinander getrennt sind.

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Fig. 11 zeigt die Ventilstellung zur Verbindung des Tanks A mit dem Motor M, indem A1 mit M1 und A2 mit M2 verbunden sind. Der Tank B ist vom Motor M abgesperrt. Die umgekehrte Schaltstellung ist in Fig. 13 dargestellt, wobei der Tank A abgesperrt und der Tank B mit dem Motor M verbunden ist. Schließlich zeigt Fig. 12 eine Stellung, in der beide Tanks A und B mit dem Motor M verbunden sind. Diese Schaltstellung ist vorgesehen für den Fall, dass beide Tanks mit dem selben Kraftstoff befüllt sind.

[0053] Die Absperrstellung gemäß Fig. 10 kann als Prüfstellung zur Dichtheitsprüfung vorgesehen sein. Dabei bilden sich im Ventil zwei Prüfkammern, die über die beiden Motoranschlüsse M1 und M2 mit einem Prüfdruck beaufschlagt werden können. Diese Prüfkammern werden von den Umfangsdichtungen **32** der Schieber **24** gedichtet. Im Falle eines gemessenen Druckabfalls des Prüfdruckes kann auf eine beschädigte oder gar fehlende Umfangsdichtung geschlossen werden.

[0054] Durch die beschriebene Ausgestaltung der Ventilanordnung **1** bzw. der beiden Schieberventile **14**, **16** werden Vor- und Rücklauf eines Tanks stets nur gemeinsam geschaltet. Dadurch sind Vertauschungen ausgeschlossen.

[0055] Es sei nochmals bemerkt, dass ein Schieberventil **14** bzw. **16** der beschriebenen Art bzw. ein Doppel-Schieberventil der bevorzugten Art auch unabhängig von der beschriebenen, speziellen Anwendung als Tank-Umschaltventil als allgemeines 4/2-bzw. 6/3- oder 6/4-Wege-Ventil verwendet werden kann.

[0056] Im Übrigen ist die Erfindung ohnehin nicht auf die beschriebenen Ausführungsbeispiele beschränkt, sondern erstreckt sich auch auf gleichwirkende Ausführungen. Ferner ist die Erfindung bislang auch noch nicht auf die im jeweils unabhängigen Anspruch definierte Merkmalskombination beschränkt, sondern kann auch durch jede beliebige andere Kombination von bestimmten Merkmalen aller insgesamt offenbarten Einzelmerkmalen definiert sein. Dies bedeutet, daß grundsätzlich praktisch jedes Einzelmerkmal des jeweils unabhängigen Anspruchs weggelassen bzw. durch mindestens ein an anderer Stelle der Anmeldung offenbartes Einzelmerkmal ersetzt werden kann. Insofern sind die Ansprüche lediglich als ein erster Formulierungsversuch für eine Erfindung zu verstehen.

Patentansprüche

1. Mehrwege-Ventilanordnung (**1**) zur Verwendung als Kraftstofftank-Umschaltventil zwischen mindestens zwei Kraftstofftanks (A, B) und einem Motor (M) in einem Kraftfahrzeug, mit mindestens zweimal zwei Tankanschlüssen (A1, A2; B1, B2). jeweils für Vorlauf und Rücklauf und zwei Motoranschlüssen (M1, M2) für Vorlauf und Rücklauf sowie mit einer Ventileinrichtung derart, dass die Vorlauf-Tankanschlüsse (A1, B1) alternativ oder gemeinsam mit dem Vorlauf-Motoranschluss (M1) und die Rücklauf-Tankanschlüsse (A2, B2) alternativ oder gemeinsam mit dem Rücklauf-Motoranschluss (M2) verbindbar sind, **dadurch gekennzeichnet**, dass die Ventileinrichtung aus mindestens zwei zusammenwirkenden, schalttechnisch symmetrischen Mehrwege-Teilventilen (V1, V2), insbesondere 4/2-Wege-Ventilen, besteht.

2. Ventilanordnung nach Anspruch 1, dadurch gekennzeichnet, dass die Teilventile (V1, V2) als zusammenwirkende Schieberventile (**14**, **16**) ausgebildet sind.

3. Ventilanordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass jedes Teilventil (V1, V2) zwei Tankanschlüsse (A1 und A2 bzw. B1 und B2) für Vor- und Rücklauf und zwei Motoranschlüsse für Vor- und Rücklauf aufweist, wobei die Vorlauf-Motoranschlüsse der Teilventile (V1, V2) miteinander zu einem gemeinsamen Vorlauf-Motoranschluss (M1) sowie die Rücklauf-Motoranschlüsse der Teilventile (V1, V2) miteinander zu einem gemeinsamen Rücklauf-Motoranschluss (M2) verbunden sind.

4. Ventilanordnung nach Anspruch 2 oder 3, dadurch gekennzeichnet, dass jedes Schieberventil (**14**, **16**) ein Ventilgehäuse (**18**) und einen in einem zylinderartigen Schieberraum (**20**) innerhalb des Ventilgehäuses (**18**) in Richtung einer Schieberachse (**22**) kolbenartig zwischen mindestens zwei Schaltstellungen längsverschiebbaren Schieber (**24**) aufweist, wobei jeder Schieberraum (**20**) an axial versetzten Stellen vier Steueröffnungen (**26**) aufweist, die jeweils mit einem der Tankanschlüsse (A1, A2 bzw. B1, B2) bzw. einem der Motoranschlüsse (M1 bzw. M2) verbunden sind.

5. Ventilanordnung nach einem der Ansprüche 2 bis 4, dadurch gekennzeichnet, dass die Schieberventile (**14**, **16**) direkt benachbart und bezüglich ihrer Schieberachsen (**22**) parallel zueinander angeordnet sind.

6. Ventilanordnung nach Anspruch 4 oder 5, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) der Schieberventile (**14**, **16**) zu einem monolithisch einstückigen Formteil (**28**) zuammengefasst sind.

7. Ventilanordnung nach Anspruch 6, dadurch gekennzeichnet, dass das Formteil (**28**) als Kunststoff-Spritzteil oder als Druckgussteil z.B. aus Aluminium oder Zink oder als spanend bearbeitetes Metall- oder Kunststoffteil ausgebildet ist.

8. Ventilanordnung nach einem der Ansprüche 4

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bis 7, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) bezüglich einer mittigen Symmetrieebene (**30**) spiegelsymmetrisch ausgebildet sind, wobei sich die Tankanschlüsse (A1, A2; B1, B2) jeweils mit zur Symmetrieebene (**30**) senkrechter oder paralleler Verlaufsrichtung von dieser weg nach außen erstrecken, und wobei die Motoranschlüsse (M1, M2) mittig mit einer der Symmetrieebene (**30**) entsprechenden Verlaufsrichtung angeordnet sind.

9. Ventilanordnung nach Anspruch 8, dadurch gekennzeichnet, dass jeder Motoranschluss (M1, M2) einen Kanal aufweist, der zur Bildung der zugehörigen Steueröffnungen (**26**) die Schieberräume (**20**) beider Schieberventile (**14**, **16**) anschneidet.

10. Ventilanordnung nach einem der Ansprüche 4 bis 9, dadurch gekennzeichnet, dass jeder Schieber (**24**) axial beabstandete Umfangsdichtungen (**32a**–d) aufweist, die mit inneren Dichtflächen (**34**) des jeweiligen Ventilgehäuses (**18**) zusammenwirken.

11. Ventilanordnung nach Anspruch 10, dadurch gekennzeichnet, dass jeder Schieber (**24**) aus einem zentrischen, axialen Kern (**36**) und mehreren, insbesondere vier, radialen, tellerartigen Ventilscheiben (**38**) sowie einem einseitig aus dem Ventilgehäuse (**18**) nach außen geführten Betätigungsende (**40**) besteht, wobei jede Ventilscheibe (**38**) auf ihrem Außenumfang in einer Ringnut (**42**) eine der Umfangsdichtungen (**32a**–d) trägt.

12. Ventilanordnung nach Anspruch 10 oder 11, dadurch gekennzeichnet, dass die Umfangsdichtungen (**32a**–d) bezüglich ihrer Außendurchmesser (D1–D3) sowie die Dichtflächen (**34a**–c) bezüglich ihrer Innendurchmesser (D'1–D'3) in Anpassung aneinander derart ausgelegt sind, dass jede Umfangsdichtung (**32b**, d), die sich bei einem Schaltvorgang axial über den Bereich einer der Steueröffnungen (**26**) bewegt, in ihrem sich axial über die Steueröffnung (**26**) hinweg erstreckenden Bewegungsbereich radial unverpresst und erst in einem jeweils axial zwischen zwei Steueröffnungen (**26**) liegenden Dichtbereich radial verpresst ist.

13. Ventilanordnung nach Anspruch 12, dadurch gekennzeichnet, dass der Schieberraum (**20**) jedes Ventilgehäuses (**18**) ausgehend von einem offenen Ende (**46**) mehrere axial über konische Übergänge (**48**) ineinander übergehende, zylindrische oder schwach konische Dichtflächen (**34a**–c) aufweist, deren Innendurchmesser (D'1 bis D'3) sich sukzessive über die konischen Übergänge (**48**) verkleinern.

14. Ventilanordnung nach einem der Ansprüche 4 bis 13, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) an ihren offenen Enden (**46**) mit einem Deckelelement (**50**) verschließbar sind, wobei vorzugsweise das Deckelelement (**50**) auch zur Führung des Betätigungsendes (**40**) des jeweiligen Schiebers (**24**) dient.

15. Ventilanordnung nach Anspruch 14, dadurch gekennzeichnet, dass das Deckelelement (**50**) jeweils eine Führungsöffnung (**52**) für einen Führungsabschnitt (**54**) des jeweiligen Schiebers (**24**) aufweist, wobei vorzugsweise eine bestimmte Drehlage mit Sicherung gegen Verdrehen der Schieber (**24**) vorgegeben ist.

16. Ventilanordnung nach einem der Ansprüche 4 bis 15, dadurch gekennzeichnet, dass jeder Schieber (**24**) in jeder von zwei Schaltstellungen insbesondere über Rastmittel (**58**) kraftformschlüssig fixiert ist.

17. Ventilanordnung nach einem der Ansprüche 4 bis 16, dadurch gekennzeichnet, dass zur Schmutzabdichtung zwischen dem Betätigungsende (**40**) jedes Schiebers (**24**) und dem Ventilgehäuse (**18**) bzw. dem damit verbundenen Deckelelement (**50**) eine faltenbalgartige Hülle (**64**) angeordnet ist.

18. Ventilanordnung nach einem der Ansprüche 4 bis 17, gekennzeichnet durch eine den Schiebern (**24**) zugeordnete Betätigungseinrichtung (**66**) zur manuellen oder motorischen, insbesondere pneumatischen oder hydraulischen oder elektromagnetischen Betätigung der Schieber (**24**).

19. Ventilanordnung nach einem der Ansprüche 3 bis 18, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) auf der Seite der Betätigungsenden (**40**) der Schieber (**24**) mit jeweils einem Zylindergehäuse (**68**) sowie die Schieber-Betätigungsenden (**40**) mit jeweils einem Betätigungskolben (**70**) verbunden bzw. verbindbar sind, wobei jedes Zylindergehäuse (**68**) einen zur Druckbeaufschlagung des Betätigungskolbens (**70**) in einen Arbeitsraum (**71**) mündenden Steuerdruckanschluss (S1, S2) aufweist.

20. Ventilanordnung nach Anspruch 19, dadurch gekennzeichnet, dass jedes Zylindergehäuse (**68**) auf der dem Arbeitsraum (**71**) gegenüberliegenden Seite des Betätigungskolbens (**70**) mindestens eine vorzugsweise mit einer ventilartigen Schmutzdichtung (**69**) ausgestattete Lüftungsöffnung (**67**) aufweist.

21. Ventilanordnung nach einem der Ansprüche 1 bis 20, dadurch gekennzeichnet, dass alle vorgesehenen Anschlüsse (A, B, M, S) als Kupplungsteile zum Steckanschluss von Leitungen ausgebildet sind, wobei vorzugsweise jeder Anschluss als muffenartige Aufnahmeöffnung (**80**) zum Einstecken eines Steckerteils (**82**) ausgebildet ist und Arretiermittel (**84**) zum lösbaren Arretieren des eingesteckten Steckerteils (**82**) vorgesehen sind.

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22. Ventilanordnung nach einem der Ansprüche 4 bis 21, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) bzw. das einstückige Formteil (**28**) und die Schieber (**24**) aus dem gleichen Material bestehen, insbesondere aus einem faserverstärkten Kunststoff, wie PA12-GF50.

23. Ventilanordnung nach einem der Ansprüche 4 bis 22, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) bzw. das Gehäuse-Formteil (**28**) mindestens zwei, insbesondere drei Befestigungselemente (**92**) aufweisen/aufweist, die insbesondere derart außerhalb der Bereiche der Dichtflächen (**34**) angeordnet sind, dass bei der Montage und/oder beim Herstellprozess verzugbedingte Verformungen im Bereich der Dichtflächen (**34**) vermieden werden.

24. Ventilanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass im Verbindungsbereich zwischen dem Deckelelement (**50**) und dem Ventilgehäuse (**18**) bzw. dem Gehäuse-Formteil (**28**) und/oder im Verbindungsbereich zwischen der Betätigungseinrichtung (**66**) und dem Deckelelement (**50**) in korrespondierende Öffnungen eingreifende Positionsansätze (**77**) insbesondere derart vorgesehen sind, dass nur eine korrekte, lagerichtige Montage möglich ist.

25. Schieberventil (**14**, **16**) insbesondere für eine Ventilanordnung (**1**) nach einem der Ansprüche 1 bis 24, bestehend aus einem Ventilgehäuse (**18**) und einem in einem zylinderartigen Schieberraum (**20**) innerhalb des Ventilgehäuses (**18**) in Richtung einer Schieberachse (**22**) kolbenartig zwischen mindestens zwei Schaltstellungen längsverschiebbaren Schieber (**24**), der axial beabstandete Umfangsdichtungen (**32**) aufweist, die mit inneren Dichtflächen (**34**) des Schieberraums (**20**) zusammenwirken, um in den Schieberraum (**20**) mündende Steueröffnungen (**26**) und damit verbundene Anschlüsse (A1, A2, B1, B2, M1, M2) entweder zumindest paarweise zu verbinden oder gegeneinander abzusperren, dadurch gekennzeichnet, dass die Umfangsdichtungen (**32a**–d) bezüglich ihrer Außendurchmesser (D1–D3) sowie die Dichtflächen (**34a**–c) bezüglich ihrer Innendurchmesser (D'1–D'3) in Anpassung aneinander derart ausgelegt sind, dass jede sich bei einem Schaltvorgang axial über eine der Steueröffnungen (**26**) hinweg bewegende Umfangsdichtung (**32b**, d) in ihrem sich über die Steueröffnung (**26**) hinweg erstreckenden Bewegungsbereich radial unverpresst und erst in einem jeweils axial zwischen zwei Steueröffnungen (**26**) liegenden Dichtbereich radial verpresst ist.

26. Schieberventil nach Anspruch 25, dadurch gekennzeichnet, dass der Schieberaum (**20**) des insbesondere als einstückiges Formteil ausgebildeten Ventilgehäuses (**18**) ausgehend von einem offenen Ende (**46**) mehrere axial über konische Übergänge (**48**) ineinander übergehende, zylindrische oder schwach konische Dichtflächen (**34a**–c) aufweist, deren Innendurchmesser (D'1 bis D'3) sich sukzessive über die konischen Übergänge (**48**) verkleinern.

27. Schieberventil-Anordnung, gekennzeichnet durch zwei direkt benachbart und bezüglich ihrer Schieberachsen (**22**) parallel zueinander angeordnete Schieberventile (**14**, **16**) nach Anspruch **25** oder **26**.

28. Schieberventil-Anordnung nach Anspruch 27, dadurch gekennzeichnet, dass die beiden Ventilgehäuse (**18**) der Schieberventile (**14**, **16**) zu einem monolithisch einstückigen Formteil (**28**), insbesondere einem Kunststoff-Spritzteil oder einem Druckgussteil z.B. aus Aluminium oder Zink oder einem spanend bearbeiteten Metall- oder Kunststoffteil, zuammengefasst sind.

29. Schieberventil-Anordnung nach Anspruch 27 oder 28, dadurch gekennzeichnet, dass die Ventilgehäuse (**18**) bezüglich einer mittigen Symmetrieebene (**30**) spiegelsymmetrisch ausgebildet sind, wobei sich je zwei separate Anschlüsse (A1, A2; B1, B2) jeweils mit zur Symmetrieebene (**30**) senkrechter oder paralleler Verlaufsrichtung von dieser weg nach außen erstrecken, und wobei zwei gemeinsame Anschlüsse (M1, M2) mittig mit einer der Symmetrieebene (**30**) entsprechenden Verlaufsrichtung angeordnet sind.

30. Schieberventil nach Anspruch 25 oder 26 oder Anordnung nach einem der Ansprüche 27 bis 29, gekennzeichnet durch mindestens ein weiteres Merkmal der Ansprüche 1 bis 24.

31. Ventilgehäuse (**18**) für eine Ventilanordnung (**1**) nach einem der Ansprüche 1 bis 24 oder für ein Schieberventil (**14**, **16**) nach Anspruch 25 oder 26 oder 30.

32. Gehäuse-Formteil (**28**) für eine Ventilanordnung (**1**) nach einem der Ansprüche 1 bis 24 oder für eine Schieberventil-Anordnung nach einem der Ansprüche 27 bis 30.

33. Schieber (**24**) für eine Ventilanordnung (**1**) nach einem der Ansprüche 1 bis 24 oder für ein Schieberventil (**14**, **16**) nach Anspruch 25, 26 oder 30 oder für eine Schieberventil-Anordnung nach einem der Ansprüche 27 bis 30.

Es folgen 6 Blatt Zeichnungen

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Anhängende Zeichnungen

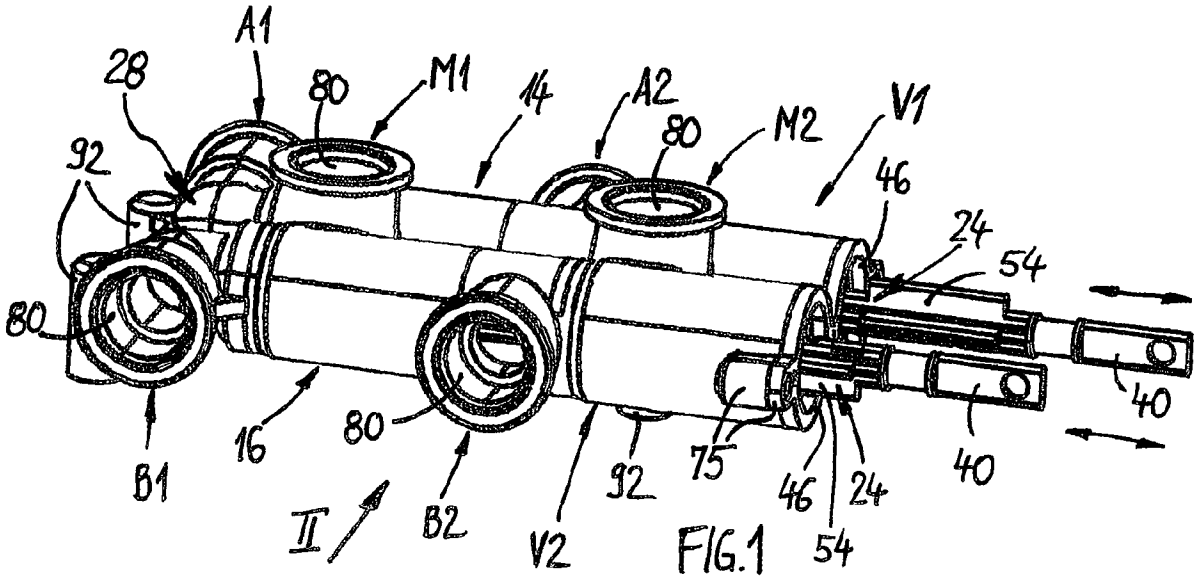


FIG.1

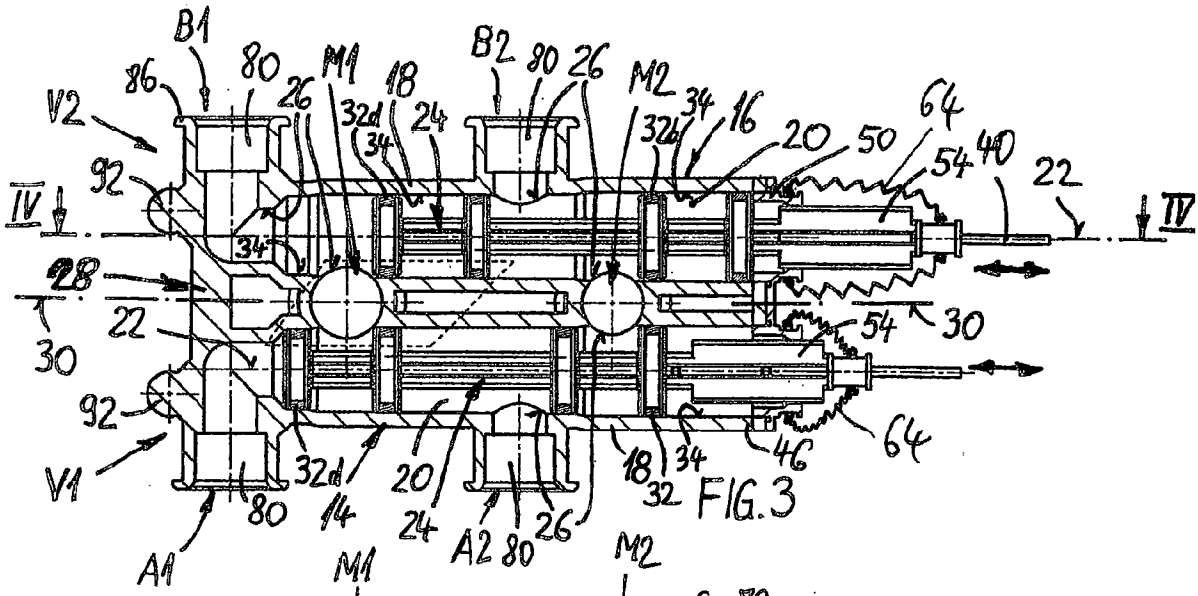


FIG.3

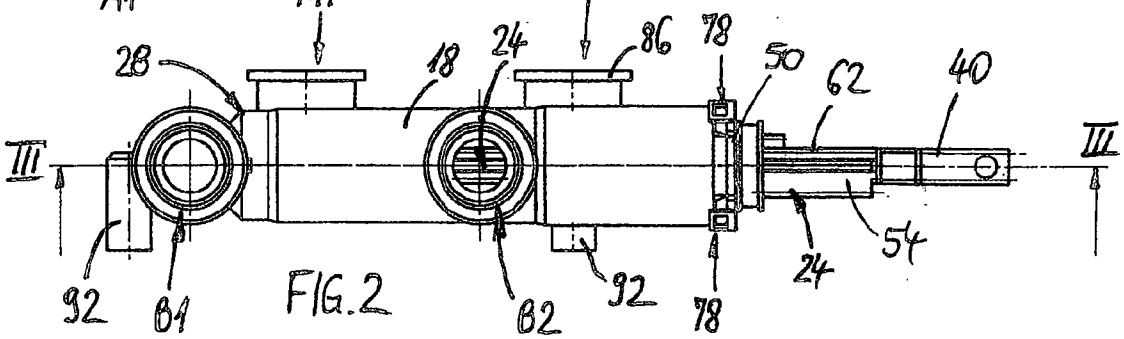


FIG.2

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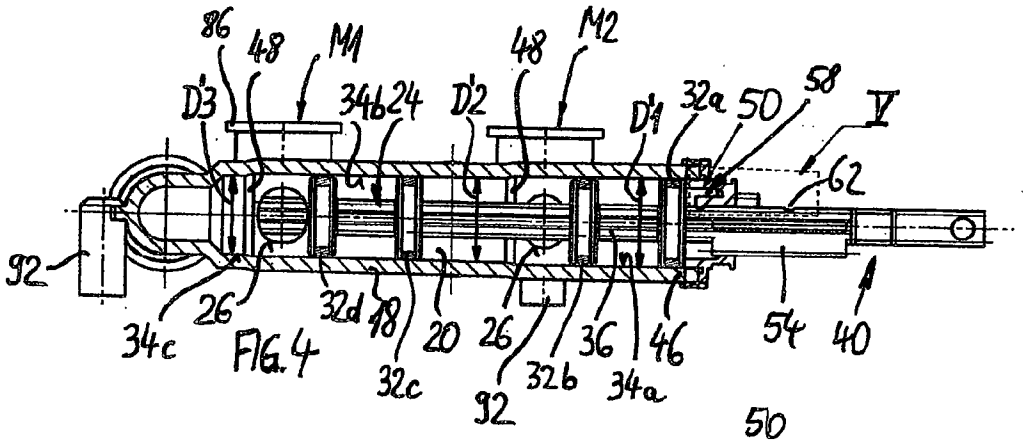


FIG.4

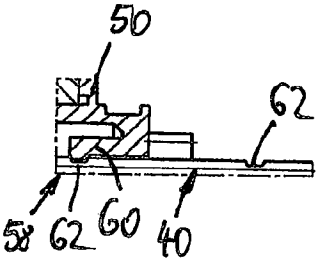


FIG.5

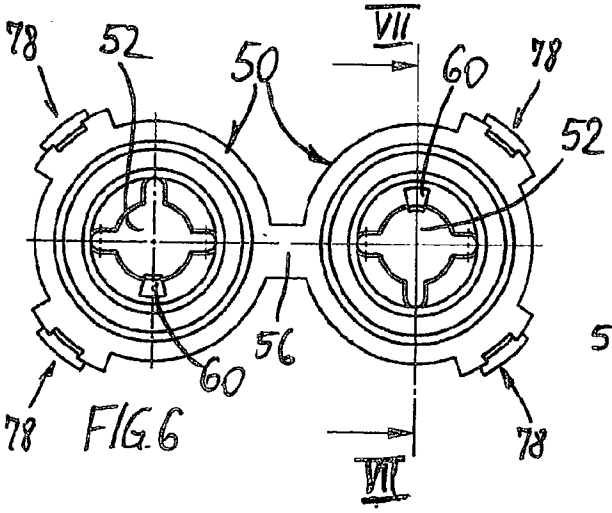


FIG.6

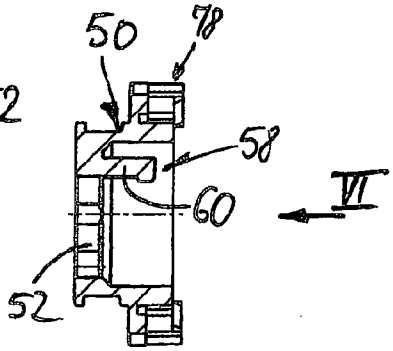


FIG.7

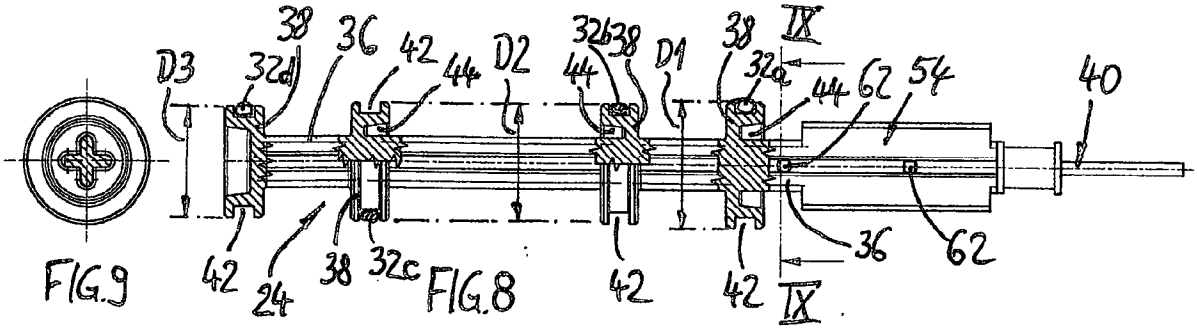


FIG.9

FIG.8

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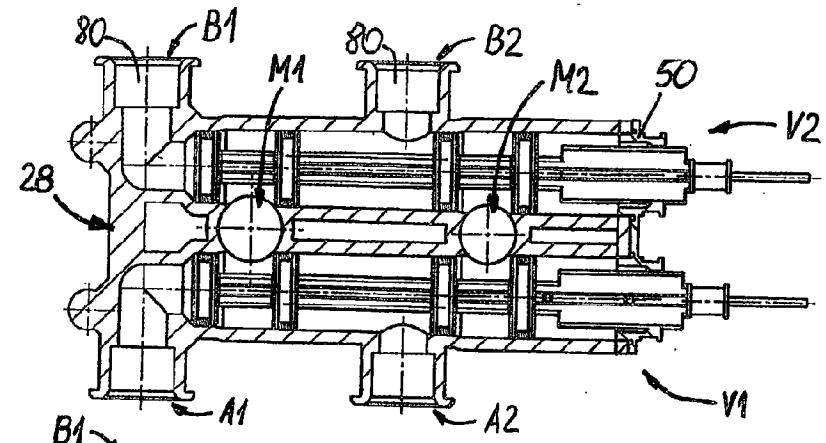


FIG. 10

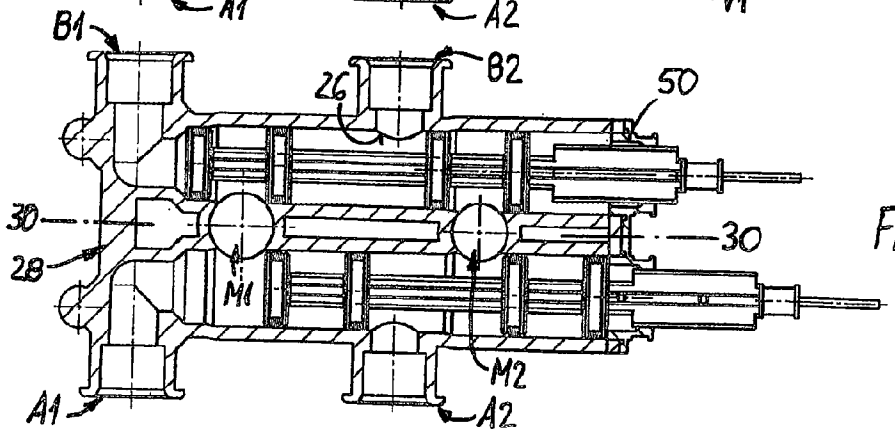


FIG. 11

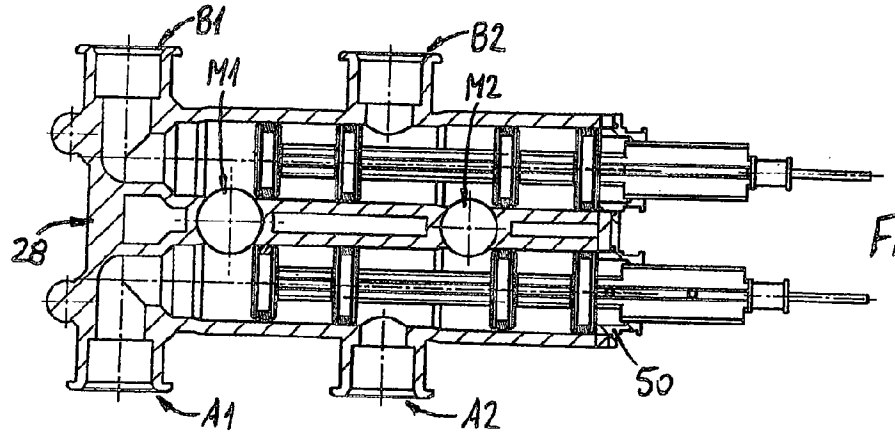


FIG. 12

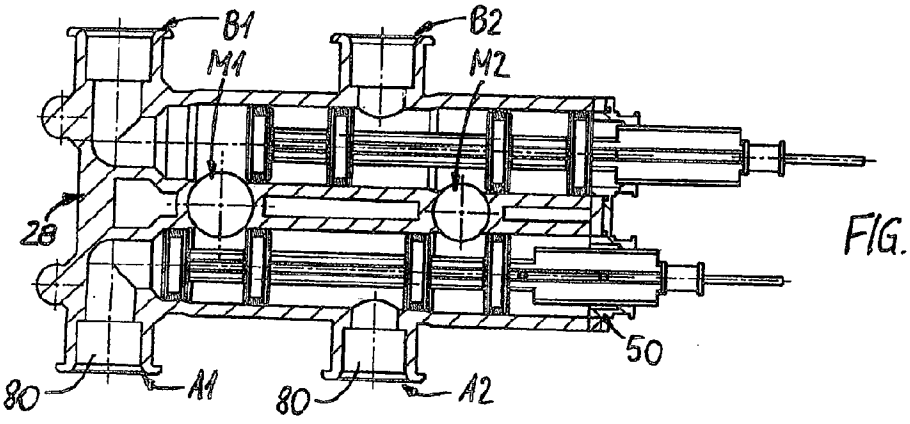


FIG. 13

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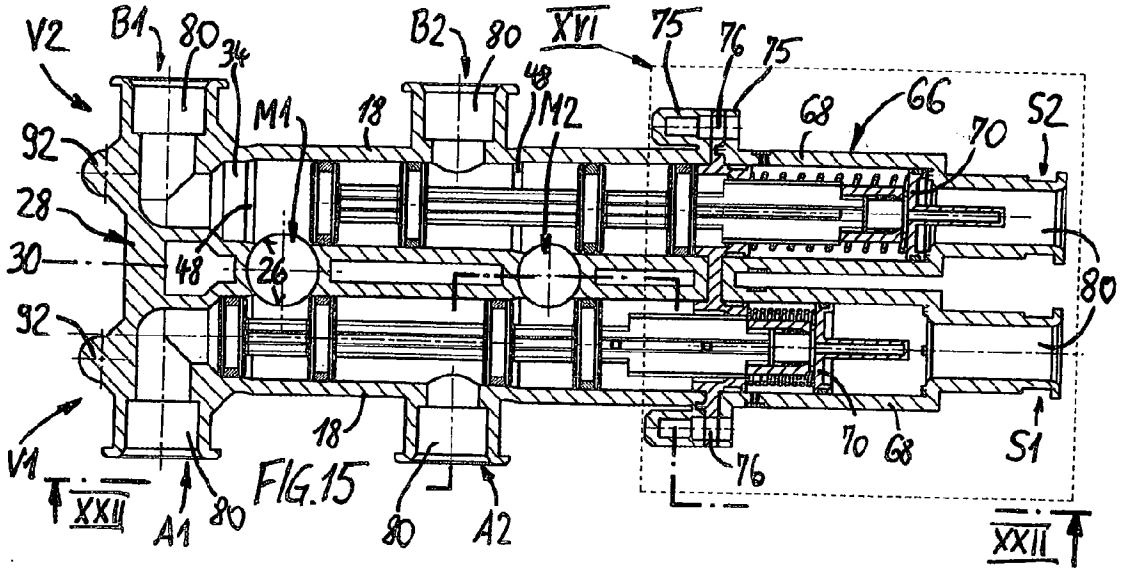


FIG.15

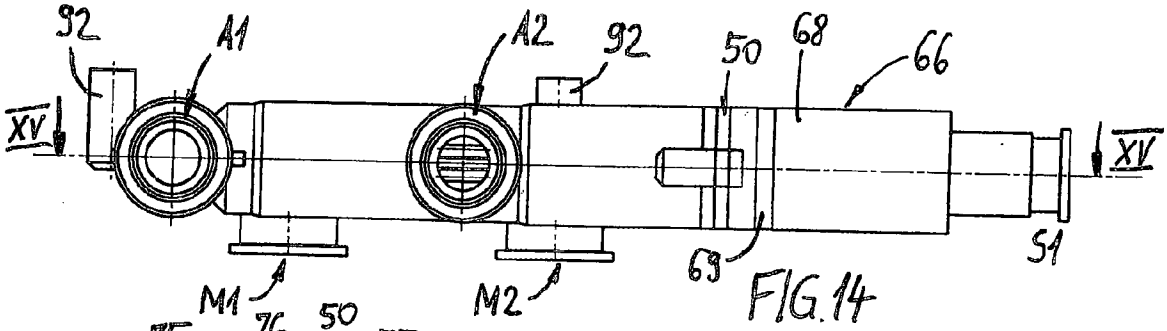


FIG.14

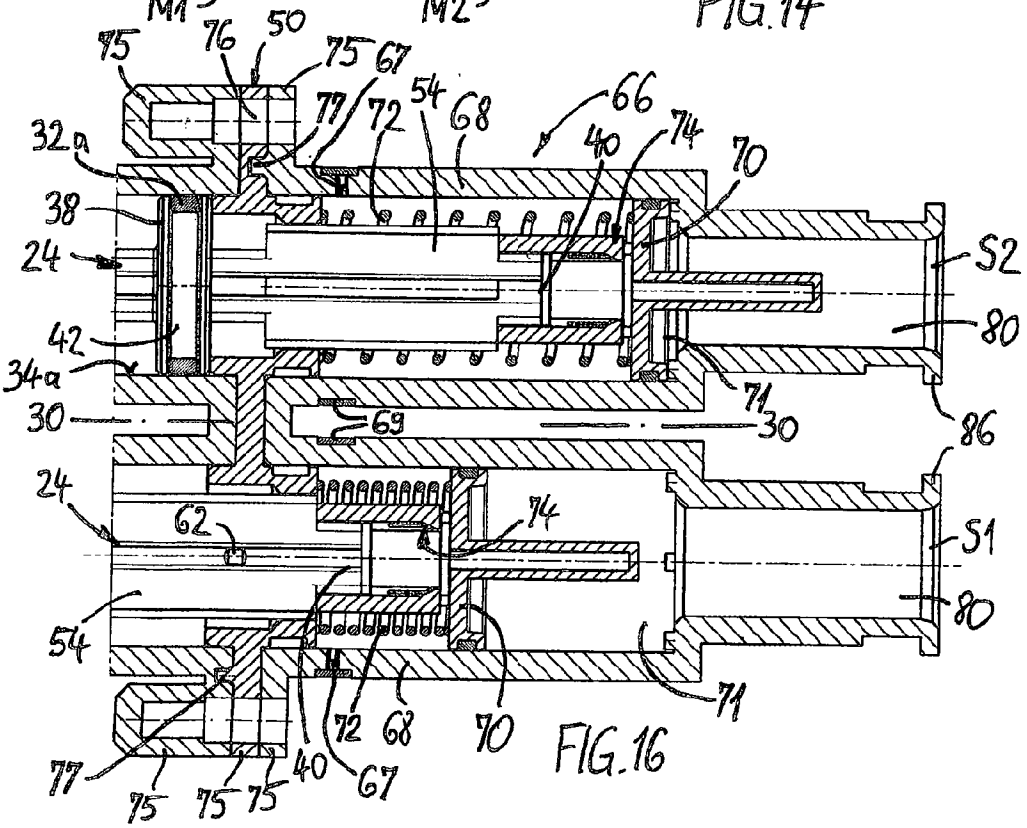


FIG.16

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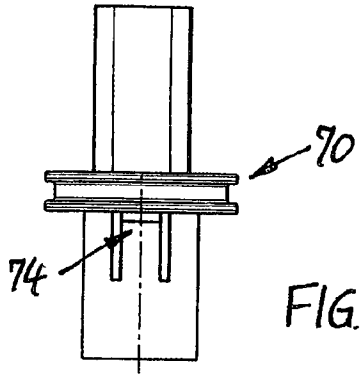


FIG.19

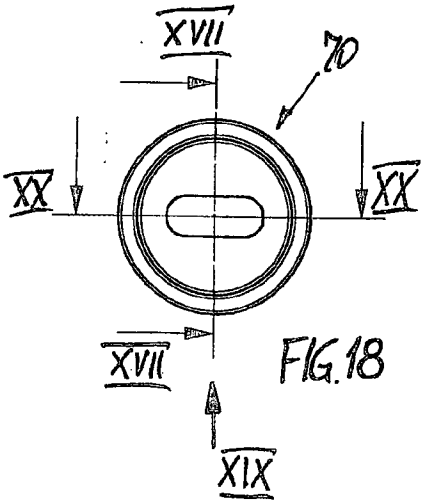


FIG.18

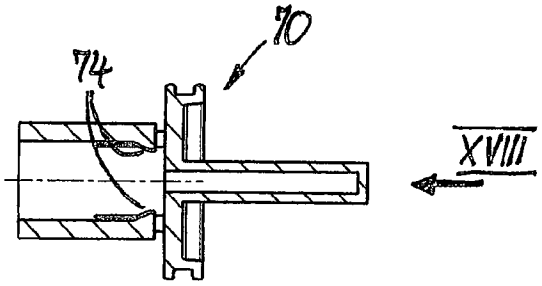


FIG.17

FIG.20

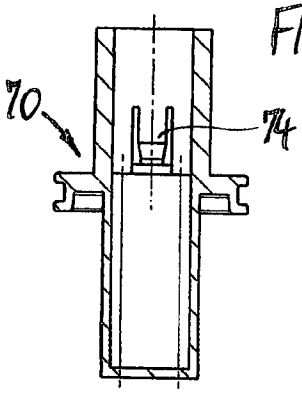
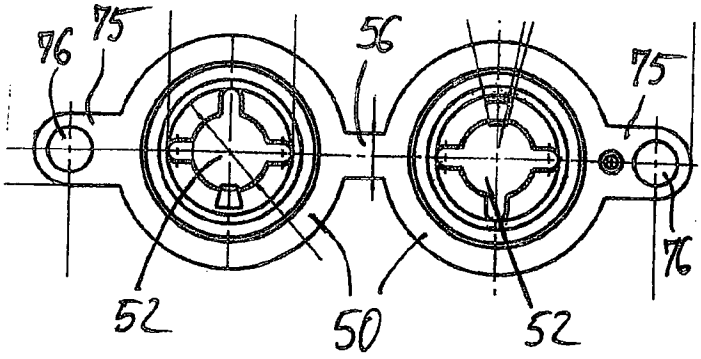


FIG.21



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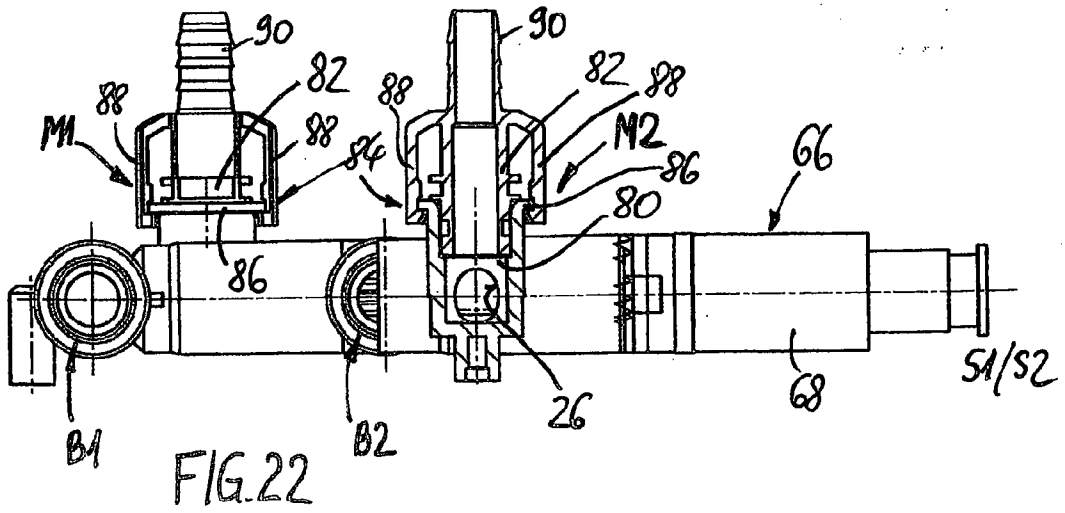


FIG.22

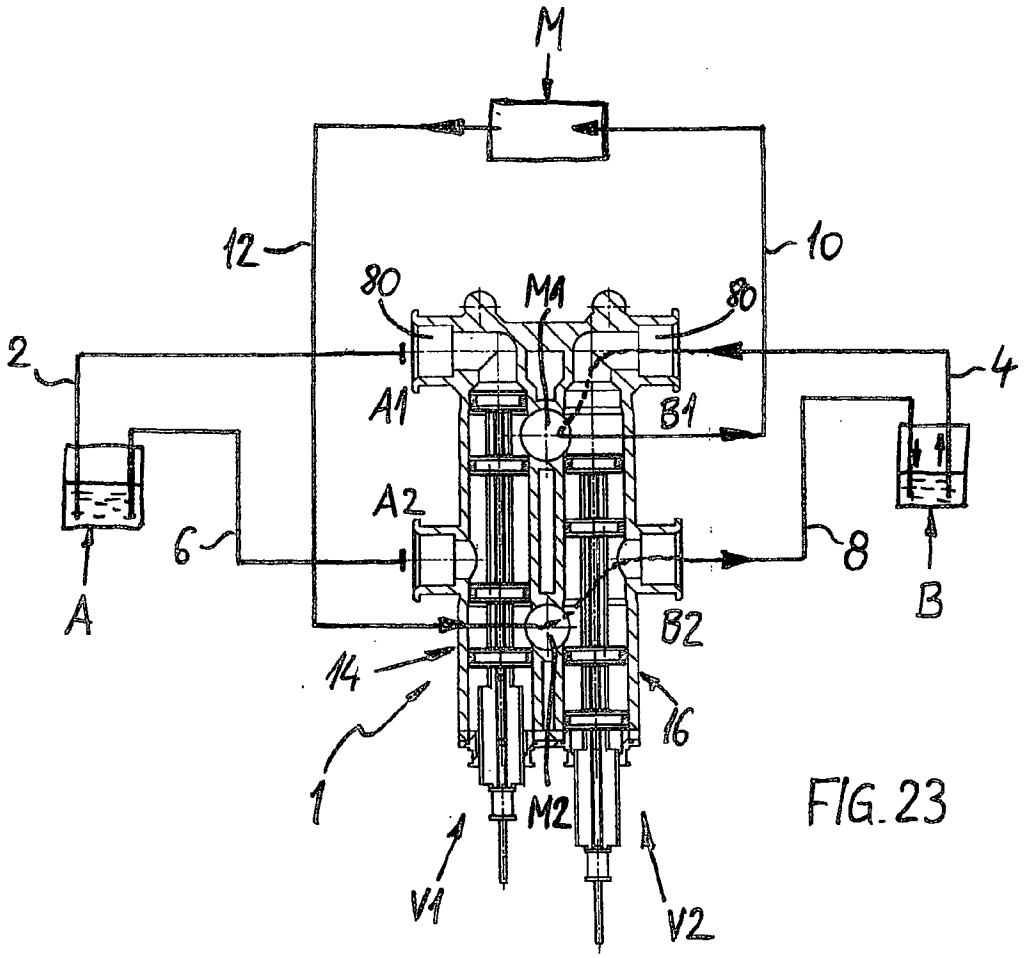


FIG.23

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Customer No. 26629 Patent
Confirmation No. 2063 Attorney Docket No. CET1090.074

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Sarder et al.
Serial No.	:	16/783,455
Filed	:	February 6, 2020
For	:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Group Art No.	:	3747
Examiner	:	Kevin A. Lathers

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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

Mailing

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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 Kevin A. Lathers** at the Patent and Trademark Office.

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Date: October 22, 2020 /Robyn L. Templin/
Signature

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

RESPONSE TO OFFICE ACTION MAILED JULY 27, 2020

Dear Sir:

Responsive to the Office Action mailed July 27, 2020, consider the following remarks:

In the Claims

1. (Original) A generator and fuel delivery system comprising:

a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and

regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

2. (Original) The generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

3. (Original) The generator and fuel delivery system of claim 2 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

4. (Original) The generator and fuel delivery system of claim 1 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

5. (Original) The generator and fuel delivery system of claim 4 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

6. (Original) The generator and fuel delivery system of claim 5 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve;

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wherein, when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator; and

wherein, when the mechanical fuel valve is in the second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

7. (Original) The generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and

wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

8. (Original) The generator and fuel delivery system of claim 7, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

9. (Original) The generator and fuel delivery system of claim 8, wherein the primary pressure regulator is mounted on the regulator mounting device.

10. (Original) The generator and fuel delivery system of claim 9, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

11. (Original) A generator and fuel delivery system comprising:

a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

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a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage; and

regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator;

wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.

12. (Original) The generator and fuel delivery system of claim 11 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. (Original) The generator and fuel delivery system of claim 12 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

14. (Original) The generator and fuel delivery system of claim 11 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

15. (Original) The generator and fuel delivery system of claim 14 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

16. (Original) A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

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

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator;

wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.

17. (Original) The dual fuel generator and fuel delivery system of claim 16 wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

18. (Original) The dual fuel generator and fuel delivery system of claim 16, further comprising a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

19. (Original) The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

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UNITED STATES
PATENT AND TRADEMARK OFFICE

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Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/783,455	**10/22/2020 05:12:31 PM ET**	**CET1090.074**

Title of Invention

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2063	FILED BY	Robyn Templin
PATENT CENTER #	60099230	FILING DATE	02/06/2020
CUSTOMER #	26629	FIRST NAMED INVENTOR	Mark J. Sarder
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Kevin Rosin

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2020.10.22 Response.pdf		9	-	538 KB
2020.10.22 Response-A....pdf	(1-1)	1	Amendment/Req. Reconsideration-After Non-Final Reject	116 KB
2020.10.22 Response-CLM.pdf	(2-5)	4	Claims	91 KB
2020.10.22 Response-REM.pdf	(6-9)	4	Applicant Arguments/Remarks Made in an Amendment	120 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2020.10.22 Response.pdf	1B43D42AFE6F54FEA8821CC659A0C18B3B0E80BB2C21E86C 9A76178D6297AE8183E3E1BF8BE7BD82C3EE1DD7781A38BE5 0B326915491B25E0B6C3FBA698A8524
2020.10.22 Response-A....pdf	8B9986EC4A4EF7F496EFBE73D4EE2ADD6339D355F20C05C4 1B774018BA7A3A23D9124289FB63E6EE8C69E525D1224BFA9 6F550F3B2CE0037C60021D0B16F795F
2020.10.22 Response-CLM.pdf	B02286DFDC4E4BB8AEC5A1D2DDA383030BFE1FA921BD1A45 CE164E3168460DE4087B6149E1FEE2C4EACC1A92CD3D3692 8006D017113A0B4B45CEFC8A2B62BD4B
2020.10.22 Response-REM.pdf	CA1903BEC01E913D793A492836BE5AEB5756C8ED17B646B75 29CBEF250A1E296A677E927547C4F5F5B602BBA87C56054C9 128361979D1031D6AFBF1F0D11EDD0

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 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 1-19 are pending in the present application. In the Office Action mailed July 27, 2020, the Examiner rejected claims 1, 4, 7, 11, 14, 16, and 18 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v= caZawwDaROg). The Examiner next rejected claims 2, 12, and 17 under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985. Claims 3, 8-10, 13, and 19 were rejected under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of NoOutage (NoOutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.corn/40248.htm). Claims 5 and 15 were rejected under 35 U.S.C. §103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al. (US Pub. 2011/0168133). Claims 1-19 were provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. 16/191,503.

Claim 6 was indicated as containing allowable subject matter. Such indication is appreciated.

Rejection under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985

The Examiner rejected claims 1, 11, and 16 under 35 U.S.C. §102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v= caZawwDaROg). In rejecting the claims, the Examiner asserted (in part) that Bassguitarist1985 discloses "a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source… (Title and 16:48 to 18:10)" and "a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent a quick-connect hose attachment for attachment to a fuel source)." *Office Action*, July 27, 2020, p. 3.

Applicant respectfully disagrees with the rejection and believes claims 1, 11, and 16 to be patentably distinct from that which is disclosed in Bassguitarist1985. That is, Bassguitarist1985 does not anticipate that which is called for in claims 1, 11, and 16, as anticipation under pre-AIA 35 U.S.C. §102(a)(a) 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*

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Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989)). As will be set forth in detail here below, Bassguitarist1985 does not disclose each and every element of claims 1, 11, and 16 and thus does not anticipate the claims, 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)).

Bassguitarist1985 discloses a gasoline generator that is converted into a tri-fuel generator. *See Bassguitarist1985*, Title. As part of the conversion to enable the generator to use propane, a demand regulator is utilized. The demand regulator may be mounted to the generator in a number of locations, such as by mounting the demand regulator outside the generator intake by drilling into the generator housing. *Bassguitarist1985*, 10:00, 11:40, by mounting the demand regulator on the back cover of the generator housing. *Bassguitarist1985*, 14:55, or by mounting the demand regulator to/on a foot of the generator using a bracket. *Bassguitarist1985*, 19:40.

Bassguitarist1985, however, does **not** teach a fuel regulator system - comprising a first stage and a second stage – that is located *off-board* the generator. Instead, in each of the mounting arrangements disclosed in Bassguitarist1985, the demand regulator is mounted *on-board* the generator – i.e., physically coupled/mounted directly to the generator – with the demand regulator mounted either directly adjacent the generator intake, on the back cover of the generator housing, or to/on a foot of the generator using a bracket. *Bassguitarist1985*, 10:00, 11:40, 14:55, 19:40.

Additionally, to the extent that Bassguitarist1985 teaches a generator "free of any pressure regulator," as asserted by the Examiner, Applicant notes that such a teaching is only provided in the context of the EF2000iS Yamaha generator as it is configured *before the conversion* thereof to a tri-fuel generator (i.e., when it is a gasoline only generator). In such a configuration, it is not a generator that is "configured to operate on a gaseous fuel supplied from a pressurized fuel source" as called for in claims 1, 11, and 16 – but instead is only configured to operate on gasoline. After conversion to a tri-fuel generator, the generator is then no longer "free of any pressure regulator," as instead, the generator then includes a demand regulator mounted *on-board* the generator, as explained in detail above.

In light of at least the above, Bassguitarist1985 does not anticipate that which is called for in claims 1, 11, and 16, as anticipation under pre-AIA 35 U.S.C. §102(a)(1) 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*, 868 F.2d at 1236). Applicant therefore believes that each of claims 1, 11, and 16 is patentably distinct from Bassguitarist1985 and respectfully requests withdrawal of the rejection of claims 1, 11, and 16 and the claims dependent therefrom.

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Double Patenting Rejection

The Examiner provisionally rejected claims 1-19 on the ground of non-statutory double patenting as being unpatentable over claims 1-17, 21, and 22 of co-pending Application No. 16/191,503.

Applicant notes that the double patenting rejection is not the only remaining rejection in the present application. The Examiner has also applied rejections under 35 U.S.C. §102(a)(1) and 35 U.S.C. §103 in the current Office Action. Applicant, therefore, requests that the double patenting rejection be held in abeyance pending resolution of the other rejections.

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 1-19.

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

Respectfully submitted,

/Kevin R. Rosin/

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Dated: October 22, 2020
Attorney Docket No.: CET1090.074

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General Authorization and Extension of Time

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

/Kevin R. Rosin/

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Dated: October 22, 2020
Attorney Docket No.: CET1090.074

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/783,455	Filing Date 02/06/2020	☐ 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 $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	10/22/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	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".	/DAWN BREWER/
*** 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.
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074	2063

26629 7590 07/27/2020

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
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EXAMINER	
LATHERS, KEVIN ANTHONY	

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
07/27/2020	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. 16/783,455	Applicant(s) Sarder et al.	
	Examiner KEVIN A LATHERS	Art Unit 3747	AIA (FITF) 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 02/06/2020.

☐ 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) 1-19 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) 1-19 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

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

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 02/06/2020 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: NPL.

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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.

Claim Interpretation

2. The term "generator" as it is used in the claims, specification, and defined in the drawings (Fig. 1, indicated as 20) is not simply the electricity producing component of the device as is common in the art, nor the electricity producing device and engine as is also common, but the entire power production assembly including the engine, electricity producing device, housing, connection ports, caps, etc. Essentially the entire device is the "generator" excluding what is outside of and not directly attached to the housing (e.g. the propane tank 30 in Fig. 1 is shown outside the housing and so is not part of the "generator").

Claim Rejections - 35 USC § 102

3. 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.

4. 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)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

5. Claim(s) 1, 4, 7, 11, 14, 16, and 18 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", Jan 3rd, 2014, https://www.youtube.com/watch?v=caZawwDaRQg).

6. **Regarding claims 1 and 11,** Bassguitarist1985 discloses a dual fuel generator and fuel delivery system (Title) comprising: a generator free of any pressure regulator (2:13, a EF2000iS Yamaha generator is shown, the generator base having no pressure regulator as is) and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line (Title and 16:48 to 18:10, lines allowing pressurized LPG into the tank are shwon); a fuel regulator system located off-board the generator and comprising a first stage and a second stage (16:48 to 18:10, the regulators are shown, the first being connected via a line to the generator and set off of it outside it, the second being adjacent a quick-connect hose attachment for attachment to a fuel source), the fuel regulator system configured to: regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator (as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

7. **Regarding claims 4, 14, and 16,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 and as it pertains to claim 16, wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line (2:13, a EF2000iS Yamaha generator is shown, the EF2000iS being a gasoline generator and therefore operating via liquid fuel supplied via liquid fuel sources and lines)

8. **Regarding claims 7 and 18,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises

a secondary pressure regulator; and wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line ((as per 16:48 – 18:10 and the title, the gaseous fuel travels via the first regulator on the quick-connect hose to the second regulator through a line into the generator).

Claim Rejections - 35 USC § 103

9. 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.

10. 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.

11. Claim 2, 12, and 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985.

12. **Regarding claims 2, 12, and 17,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. However, dual stage regulators for gaseous fuel systems are old and well-known in the art sufficient for examiner to take official notice that it would have been obvious to one of ordinary skill in

the art before the filing date of the invention to include a dual stage regulator as either a combination of the included two regulators or in place of either of the regulators, as dual stage regulators are known devices that improve the efficiency and reliability of a pressure regulation system.

14. Claim 3, 8-10, 13, and 19 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm).

15. **Regarding claims 3, 8-10, 13, and 19,** Bassguitarist1985 discloses the generator and fuel delivery system of claims 2 and 7, but fails to disclose wherein the regulators, either dual stage or separate single stages, is mounted via a regulator mounting device to a collar of a pressure fuel container.

16. Nooutage discloses a fuel system for a generator (first section, the object being an LP generator), wherein the fuel system includes liquid propane gas containers with a collar mounting bracket supporting a dual-stage regulator ("Hose connection to portable tanks", the image reproduced below).



17. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to move the regulators of Bassguitarist1985 to a collar mounting bracket as shown in Nooutage as it would constitute nothing more an applying a known technique of mounting a regulator in

a secure and easily accessible position being applied to a known and similar device – the dual fuel generator LPG fuel system – to yield predictable and known results. Further, the devices operation would not be impacted in any way, shape, or form and would function identically, the only difference being in the ease of usage of an operator and safety of the regulators (instead of dangling, they would be firmly mounted to the fuel sources). *Ruiz v. AB Chance Co.*, 357 F.3d 1270, 69 USPQ2d 1686 (Fed. Cir. 2004)

18. Claim 5 and 15 is/are rejected under 35 U.S.C. 103 as being unpatentable over Bassguitarist1985 in view of Pursifull et al (US 2011/0168133).

19. **Regarding claim 5 and 15,** Bassguitarist1985 discloses the generator and fuel delivery system of claim 4, but fails to disclose further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

20. Pursifull discloses an engine system operating on a liquid fuel and a gaseous fuel (¶ [0022], the gaseous fuel being a fuel such as propane), wherein the fuel systems are controlled via a three-way valve 120 (Fig. 1, shown), and wherein this valve actuates and controls which fuel reaches the engine 102 (¶ [0025]). This valve control allows further control of the fuel system and allows for fuel shut off to both systems if need be in order to allow for a reduction in emissions and improved engine operation (¶ [0004] and [0005]).

21. Therefore, it would have been obvious to one of ordinary skill in the art before the filing date of the invention to modify the bass device of Bassguitarist1985 with the ideas of Pursifull, wherein a mechanical valve may be installed up stream of a fuel rail (or in the case of Bassguitarist1985, a carburetor), in order to more precisely control fuel flow and reduce engine emissions.

Double Patenting

22. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission.

For more information about eTerminal Disclaimers, refer to

www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

23. Claims 1-19 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17, 21, and 22 of copending Application No. 1**6/191,503** (reference application). Although the claims at issue are not identical, they are not patentably distinct from each other because the limitations contained within the instant application are identical to those of the reference application. The only difference in application scopes being the instant applications limitation of the generator being free from regulators, however the reference application does not disclose the generator including a regulator and instead specifically states that the regulators are located off-board from the generator.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Allowable Subject Matter

24. Claim 6 is would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if the double-patenting rejection above is overcome.

25. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art fails to disclose or make obvious a mechanical fuel valve that when actuated blocks the coupling of the fuel systems to the dual fuel generator from their fuel source.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sportsman (Sportsman, "GEN7500DF 7500 SURGE WATTS / 6000 RUNNING WATTS DUAL FUEL LPG LIQUID PROPANE & GASOLINE PORTABLE GENERATOR INSTRUCTION MANUAL," https://images.homedepot-static.com/catalog/pdfImages/d7/d711ccfb-08f5-43c4-a785-

f792642424c4.pdf) – Sportsman was available for sale on November 19th, 2013 as per Amazon (Amazon, https://www.amazon.com/Sportsman-GEN7500DF-4-Stroke-Portable-Generator/dp/B00GX9K8A4, November 19th, 2013).

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN A LATHERS whose telephone number is (571)272-1050. The examiner can normally be reached on M-F 10a-6p.

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 5712721196. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/KEVIN A LATHERS/
Primary Examiner, Art Unit 3747

Notice of References Cited	Application/Control No. 16/783,455	Applicant(s)/Patent Under Reexamination Sarder et al.	
	Examiner KEVIN A LATHERS	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-20110168133-A1	07-2011	Pursifull; Ross Dykstra	F02D19/0647	123/495
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	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	Sportsman (Sportsman, "GEN7500DF 7500 SURGE WATTS / 6000 RUNNING WATTS DUAL FUEL LPG LIQUID PROPANE & GASOLINE PORTABLE GENERATOR INSTRUCTION MANUAL," https://images.homedepot-static.com/catalog/pdfImages/d7/d711ccfb-08f5-43c4-a785-f792642424c4.pdf) (Year: 2013)
	V	Amazon (Amazon, https://www.amazon.com/Sportsman-GEN7500DF-4-Stroke-Portable-Generator/dp/B00GX9K8A4, November 19th, 2013). (Year: 2013)
	W	Nooutage (Nooutage.com, "Standby Generator Set", Nov. 13th, 2006, http://web.archive.org/web/20061113112733/http://www.nooutage.com/40248.htm). (Year: 2006)
	X	Bassguitarist1985 (Bassguitarist1985, "Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips", https://www.youtube.com/watch?v=caZawwDaRQg). (Year: 2014)

*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
	16/783,455	Sarder et al.
	Examiner	Art Unit
	KEVIN A LATHERS	3747

CPC - Searched*		
Symbol	Date	Examiner
F02D19/0613, 19/0605, 19/0647	07/21/2020	/k.L./
Y02Y10/36	07/21/2020	/k.L./

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
Google and EAST searches.	07/21/2020	/k.L./
Inventor and assignee search.	07/21/2020	/k.L./

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

/KEVIN A LATHERS/ Primary Examiner, Art Unit 3747	

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/783,455	Sarder et al.
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	KEVIN A LATHERS	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	07/21/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	"20110168133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/21 16:29
S1	445	F02D19/0613.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S2	1,204	F02D19/0605.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S3	3,408	F02D19/0647.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S4	15,258	Y02T10/36.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:25
S5	808	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:28
S6	79	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel) and (second secondary auxiliary) near5 (regulat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:29

S7	64	(S1 S2 S3 S4) and (switch valve) near20 (propane natural adj gas gaseous lng cng) near20 (gasoline liquid diesel) and (second secondary auxiliary) adj (regulat$3 pressure)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:44
S8	28	("5450832" | "20130220274" | "5325835" | "5320078" | "4619240" | "6082323" | "6453877" | "5171487" | "6223730" | "6213083" | "4489699" | "5287839" | "8590510" | "5673670" | "4450821" | "5816224" | "6276345" | "4502453" | "20130047964" | "4372276" | "6401685" | "7905469" | "2722208" | "4895124" | "5161496" | "5379740" | "5438968" | "5419291" | "6914342" | "8342158").PN.	USPAT	OR	OFF	2017/07/27 14:45
S9	124	("5450832" | "20130220274" | "5325835" | "5320078" | "4619240" | "6082323" | "6453877" | "5171487" | "6223730" | "6213083" | "4489699" | "5287839" | "8590510" | "5673670" | "4450821" | "5816224" | "6276345" | "4502453" | "20130047964" | "4372276" | "6401685" | "7905469" | "2722208" | "4895124" | "5161496" | "5379740" | "5438968" | "5419291" | "6914342" | "8342158").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:45
S10	421	(duel dual) near5 fuel near20 (engine generator) same (switch valve) near20 between	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 14:46
S11	0	dual adj fuel near20 engine same "switchover valve"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:17
S12	44	dual adj fuel near20 engine same (switch switchover) near5 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:19
S13	49	"6591817"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2017/07/27 15:19

			DERWENT; IBM_TDB			
S14	63	("3799125" | "4150645" | "4265208" | "4303049" | "4305350" | "4323046" | "4353345" | "4391251" | "4398517" | "4524033" | "4671243" | "5450832" | "5524582" | "5623907" | "5720266" | "5816224" | "6035837").PN. OR ("6591817").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:20
S15	80	dual adj fuel near20 engine same (switch switchover select$3) near5 valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/27 15:21
S16	30	(("SARDER") near3 ("Mark")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S17	28	(("SOTIRIADES") near3 ("Aleko")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S18	41	(("DEHN") near3 ("James")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S19	15	(("JENISON") near3 ("Leigh")).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:25
S20	16	(("CHAMPION") near3 ("ENGINE") near3 ("TECHNOLOGY") near3 ("LLC")).AANM.	USPAT	OR	OFF	2017/07/27 15:25
S21	19	(("CHAMPION") near3 ("ENGINE") near3 ("TECHNOLOGY") near3 ("LLC")).as.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:26
S22	5	("20040240141" | "20060169238" | "20130098349" | "20130122439" | "4489699").PN. OR ("9435273").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:42
S23	41	("1973142" | "2315882" | "2381304" | "4068639" | "4227497" | "4335697").PN. OR ("4489699").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 15:43
S24	97	(dual multi multiple plural plurality) adj fuel near20 engine same (switch switchover changeover change switch$3) near5 (valve switch)	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:02
S25	1	(09/813622).APP.	USPAT; USOCR	OR	OFF	2017/07/27 16:03

S26	63	("3799125" | "4150645" | "4265208" | "4303049" | "4305350" | "4323046" | "4353345" | "4391251" | "4398517" | "4524033" | "4671243" | "5450832" | "5524582" | "5623907" | "5720266" | "5816224" | "6035837").PN. OR ("6591817").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:03
S27	64	("4335697" | "4393848" | "4430978" | "4606322" | "4683864" | "4825842" | "4922862" | "5379740" | "5474047" | "5479906" | "5755211" | "5775282").PN. OR ("6035837").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/07/27 16:34
S28	27	("5999888" | "6543395" | "4619240" | "20140366577" | "20120168023" | "20140202430" | "4463735" | "5668310" | "5224457").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 10:32
S29	0	(14/156204).APP.	USPAT; USOCR	OR	OFF	2017/07/28 11:33
S30	5	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (quick-connect connect$3) near20 (cover flange)	USPAT; USOCR	OR	OFF	2017/07/28 11:47
S31	109	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (quick-connect connect$3) near20 (cover flange)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 11:47
S32	280	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (cover flange)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 11:48
S33	171	(gas gasoline liquid near5 fuel) near20 (propane natural adj gas) near20 (fill$3 fueling) same (cover flange) not S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 11:48
S34	5	"9435273"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/07/28 14:35

S35	1	"20070137591"	USPAT	OR	OFF	2018/02/12 15:56
S37	34	(champion near3 engine).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/02/12 15:59
S38	95	dual adj fuel near20 valve near10 switch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:19
S39	48	"4489699"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S40	5	"20070137591"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S41	29	"3412258"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S42	3	"20100258099"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S43	53	"5611312"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/02/12 16:30
S44	138	(S39 S40 S41 S42 S43)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2018/02/12 16:31

			DERWENT; IBM_TDB			
S45	1	(10/591304).APP.	USPAT; USOCR	OR	OFF	2018/02/12 16:45
S46	6	("6332433" | "7146962").PN. OR ("7325519").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/02/12 16:46
S47	35	(US-20020014077-$ or US-20030168024-$ or US-20110168133-$ or US-20120204835-$ or US-20030010320-$ or US-20160363099-$ or US-20170037796-$ or US-20020134362-$ or US-20140202430-$ or US-20160221518-$ or US-20070137591-$).did. or (US-5320078-$ or US-5450832-$ or US-5816224-$ or US-6591817-$ or US-5524582-$ or US-4570605-$ or US-4712516-$ or US-9435273-$ or US-4489699-$ or US-4305350-$ or US-4353345-$ or US-6035837-$ or US-6904873-$ or US-7045916-$ or US-5092305-$).did. or (US-2558884-$ or US-2470747-$ or US-3022425-$ or US-3451424-$).did. or (JP-2004278332-$).did. or (US-20080290531-$ or US-20130047964-$ or US-4463735-$ or CN-203796423-$).did.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2018/02/12 17:19
S48	35	(US-20020014077-$ or US-20030168024-$ or US-20110168133-$ or US-20120204835-$ or US-20030010320-$ or US-20160363099-$ or US-20170037796-$ or US-20020134362-$ or US-20140202430-$ or US-20160221518-$ or US-20070137591-$).did. or (US-5320078-$ or US-5450832-$ or US-5816224-$ or US-6591817-$ or US-5524582-$ or US-4570605-$ or US-4712516-$ or US-9435273-$ or US-4489699-$ or US-4305350-$ or US-4353345-$ or US-6035837-$ or US-6904873-$ or US-7045916-$ or US-5092305-$).did. or (US-2558884-$ or US-2470747-$ or US-3022425-$ or US-3451424-$).did. or (JP-2004278332-$).did. or (US-20080290531-$ or US-20130047964-$ or US-4463735-$ or CN-203796423-$).did.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2018/02/13 17:40
S50	17	S48 and regulator	US-PGPUB; USPAT;	OR	OFF	2018/02/13 17:40

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S56	61	("20020134362" | "20040139943" | "20070137591" | "20100258099" | "20110168133" | "20110253102" | "20130047964" | "20130220274" | "20140202430" | "20140238340" | "20140373531" | "20150122230" | "2722208" | "3384059" | "3412258" | "3659574" | "3718000" | "3783849" | "3888223" | "4335697" | "4372276" | "4373493" | "4450821" | "4463735" | "4480595" | "4489699" | "4502453" | "4619240" | "4628871" | "4708094" | "4895124" | "4979480" | "5092305" | "5161496" | "5171487" | "5228423" | "5287839" | "5320078" | "5325835" | "5379740" | "5419291" | "5438968" | "5450832" | "5611312" | "5673670" | "5816224" | "6082323" | "6213083" | "6223730" | "6276345" | "6401685" | "6453877" | "6591817" | "6914342" | "7905469" | "8342158" | "8590510" | "9435273").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/05 15:38
S57	37	(US-20020014077-$ or US-20030168024-$ or US-20110168133-$ or US-20120204835-$ or US-20030010320-$ or US-20160363099-$ or US-20170037796-$ or US-20020134362-$ or US-20140202430-$ or US-20160221518-$ or US-20070137591-$ or US-20130047964-$ or US-20150122230-$).did. or (US-5320078-$ or US-5450832-$ or US-5816224-$ or US-6591817-$ or US-5524582-$ or US-4570605-$ or US-4712516-$ or US-9435273-$ or US-4489699-$ or US-4305350-$ or US-4353345-$ or US-6035837-$ or US-6904873-$ or US-7045916-$ or US-5092305-$).did. or (US-2558884-$ or US-2470747-$ or US-3022425-$ or US-3451424-$).did. or (JP-2004278332-$).did. or (US-20080290531-$ or US-20130047964-$ or US-4463735-$ or CN-203796423-$).did.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2019/03/05 16:01
S58	5	S57 and (regulator and valve).clm.	USPAT	OR	OFF	2019/03/05 16:02

S59	8	S57 and (regulator and valve).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/03/05 16:02
S60	10	S57 and (pressure and valve).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/03/05 16:02
S61	1,423	engine same (dual multiple plural$3 double two) near5 fuel same pressure near4 regulat$3 same valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/03/05 16:03
S62	24	"10221780"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/03/05 17:48
S63	2	(dual-stage double-stage) near5 regulator near20 (fuel propane gas) same engine	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/08/27 13:19
S64	9	generator same (gaseous propane lpg lng natural adj gas) same (off-board offboard off adj board) near20 (regulator tank)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/11/26 16:21
S65	9	generator same (gaseous propane lpg lng natural adj gas) same (off-board offboard off adj board) near20 (regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/11/26 16:21
S66	9	generator same (gaseous propane lpg lng natural adj gas) same (off-board offboard off adj board) near20 (regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/11/26 16:21

S67	0	(14/925441).APP.	USPAT; USOCR	OR	OFF	2019/11/26 16:24
S68	43	"4489699"	USPAT; USOCR	OR	OFF	2019/11/26 16:25
S69	4	"5809979"	USPAT; USOCR	OR	OFF	2019/11/26 16:25
S70	42	(propane natural adj gaseous gaseous near2 fuel) near20 (source tank container) near20 (regulat$3) near5 (mount$3 attach$4)	USPAT	OR	OFF	2020/04/22 16:15
S71	72	(propane natural adj gaseous gaseous near2 fuel) near20 (source tank container) near20 (regulat$3) near5 (mount$3 attach$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/04/22 16:16
S72	1,962	(engine generator) same (propane natural adj gas gaseous adj fuel) same carburetor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 15:53
S73	5,348	(engine generator) same (propane natural adj gas gaseous adj fuel) same (offboard off-board outside external)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 15:56
S74	1,619	(engine generator) same (propane natural adj gas gaseous adj fuel) same (offboard off-board outside external) near10 (tank container fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 15:56
S75	993	(engine generator) same (propane natural adj gas gaseous adj fuel) same (offboard off-board external) near10 (tank container fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 15:57
S76	0	(extern offboard off-board) near4 propane adj (tank container reservoir source)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 16:27

S77	74	(external offboard off-board) near4 propane adj (tank container reservoir source)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 16:27
S78	168	(external offboard off-board) near4 (gaseous adj fuel natural adj gas) adj (tank container reservoir source)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 16:28
S79	37	(S77 S78) and regulator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/07/20 16:28

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S51	88	F02D19/0613.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S52	273	F02D19/0605.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S53	747	F02D19/0647.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S54	3,711	Y02T10/36.cpc.	US-PGPUB; USPAT	OR	OFF	2018/11/20 12:06
S55	1	(engine and lockout and fuel and first adj fuel and second adj fuel and source and switch).clm.	US-PGPUB; USPAT	OR	OFF	2018/11/20 15:47

7/21/2020 4:31:48 PM
C:\Users\klathers\Documents\EAST\Workspaces\14738060.wsp

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United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/783,455	02/06/2020	Mark J. Sarder	CET1090.074

CONFIRMATION NO. 2063

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

PUBLICATION NOTICE

OC000000117504884

Title:OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Publication No.US-2020-0173379-A1
Publication Date:06/04/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/783,455

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	19 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/783,455	02/06/2020	3741	785	CET1090.074	19	3

CONFIRMATION NO. 2063

FILING RECEIPT

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

OC000000114955385

Date Mailed: 02/27/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Inventor(s)

Mark J. Sarder, Waukesha, WI;
Aleko D. Sotiriades, Cedarburg, WI;
James J. Dehn, Brookfield, WI;
Leigh Jenison, Hartland, WI;

Applicant(s)

Champion Power Equipment, Inc., Santa Fe Springs, CA;

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

Domestic Priority data as claimed by applicant

This application is a CON of 16/191,503 11/15/2018
which is a CON of 14/738,060 06/12/2015 PAT 10221780

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

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If Required, Foreign Filing License Granted: 02/25/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/783,455**

Projected Publication Date: 06/04/2020

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Preliminary Class

060

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

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Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
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Application Number	
Filing Date	
First Named Inventor	Mark J. Sarder
Title	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
Art Unit	
Examiner Name	
Attorney Docket Number	CET1090.074

SIGNATURE of Applicant or Patent Practitioner

Signature	/Kevin R. Rosin/	Date (Optional)	2020-02-06
Name	Kevin R. Rosin	Registration Number	55584
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	Champion Power Equipment, Inc.		

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

☑ *Total of 1 forms are submitted.

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

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
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POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

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

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 26629

OR

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

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

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

☐ Inventor or Joint Inventor (title not required below)

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

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

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

SIGNATURE of Applicant for Patent

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

Signature		Date (Optional)	01-05-2019
Name	Dennis Trine		
Title	Chief Executive Officer, Champion Power Equipment, Inc.		

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

☑ Total of 1 forms are submitted.

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

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

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
First Named Inventor/Applicant Name:	Mark J. Sarder
Filer:	Kevin Roger Rosin./Robyn Templin
Attorney Docket Number:	CET1090.074

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**785**

Electronic Acknowledgement Receipt

EFS ID:	38512020
Application Number:	16783455
International Application Number:	
Confirmation Number:	2063
Title of Invention:	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE
First Named Inventor/Applicant Name:	Mark J. Sarder
Customer Number:	26629
Filer:	Kevin Roger Rosin./Robyn Templin
Filer Authorized By:	Kevin Roger Rosin.
Attorney Docket Number:	CET1090.074
Receipt Date:	06-FEB-2020
Filing Date:	
Time Stamp:	13:14:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$785
RAM confirmation Number	E202026D15329160
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	Application Data Sheet	App-ADS.pdf	1246227 1efebd2e05d05743c09eaf322e0f8ef9b144dc7c	no	9
Warnings:					
Information:					
2		App-Body.pdf	523121 f5de3e09e6f41045621d5e98197cb402a14fb66c	yes	25

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	19
Claims	20	24
Abstract	25	25

Warnings:					
Information:					
3	Oath or Declaration filed	App-Dec.pdf	1265909 c028f3708d260161b95499f20cdf03143206a865	no	4
Warnings:					
Information:					
4	Drawings-only black and white line drawings	App-Drawings.pdf	532716 b5e37d3428af7d9ce21773708acc84cbdd4e9e23	no	5
Warnings:					
Information:					
5	Power of Attorney	POATransmittal.pdf	156663 110054e3544bb245ddcaae2c80f1e128ac720a59	no	1

Warnings:					
Information:					
6	Power of Attorney	GeneralPOA.pdf	544821 bd74c375383840c5c68c688e757b3083add0a4e7	no	1
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	35259 f453a2d5fb483aa268fc775103a4efff22356eeb	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	4304716	

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Mark	J.	Sarder	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Waukesha	WI	US

Mailing Address of Inventor:

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

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Aleko	D.	Sotiriades	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Cedarburg	WI	US

Mailing Address of Inventor:

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

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	James	J.	Dehn	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

City	Brookfield	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

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

Inventor 4 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Leigh		Jenison	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Hartland	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

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

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

Correspondence Information:

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

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

Customer Number	26629		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE		
Attorney Docket Number	CET1090.074	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	26629		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16191503	2018-11-15

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16191503	Continuation of	14738060	2015-06-12	10221780	2019-03-05

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

Applicant Information:

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

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Champion Power Equipment, Inc.		
Mailing Address Information For Applicant:			
Address 1	12039 Smith Avenue		
Address 2			
City	Santa Fe Springs	**State/Province**	CA
Country	US	Postal Code	90670
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Kevin R. Rosin/			Date (YYYY-MM-DD)	2020-02-06
First Name	Kevin R.	Last Name	Rosin	Registration Number	55584

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CET1090.074
	Application Number	
Title of Invention	OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE	

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Privacy Act Statement

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

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

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is a continuation of, and claims priority to, U.S. Patent Application Serial No. 16/191,503, filed on November 15, 2018, which is a continuation of, and claims priority to, U.S. Patent Application Serial No. 14/738,060, filed on June 12, 2015, now U.S. Patent No. 10,221,780, issued March 5, 2019, the disclosures of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] Embodiments of the invention relate generally to dual fuel generators, and more particularly, to an apparatus and method for delivering liquid fuel and gaseous fuel to a dual fuel generator.

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

[0004] Certain generators are configured to operate as "dual fuel" generators, otherwise known as bi-fuel generators. These generators are driven by an internal combustion engine that is configured to operate on a liquid fuel for a period of operation and an alternative fuel for another period of operation. The alternative fuel source may

exist in a gaseous state at normal temperature and pressure and can be any one of liquefied petroleum gas, compressed natural gas, hydrogen, or the like. Liquefied petroleum gas (LPG), often referred to as propane, exists in a gaseous state at normal temperature and pressure but can be conveniently stored under pressure in a liquid state. LPG may be a desirable fuel source for internal combustion engines because it can be stored for longer periods of time and contains fewer impurities than gasoline, resulting in smoother and cleaner operation, and often resulting in a longer lasting engine.

[0005] In order to provide the liquid and gaseous fuel to the engine, the dual fuel engine may have a first fuel line for liquid fuel and a second fuel line for gaseous fuel. A liquid fuel source and a gaseous fuel source may be coupled to the respective lines to provide fuel to the engine. However, a common problem with such configurations that couple two fuel sources to a single engine is the engine can experience overly rich air-fuel ratio when both fuels are simultaneously engaged during cross-over switching between the fuel sources. Further, such simultaneous delivery of fuel from the first fuel line and the second fuel line may make the engine hard to start or lead to unstable operating conditions.

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

Champion - EX2108, Page 424 of 456
Harbor Freight Tools USA, Inc. et al v. Champion Power Equip., Inc.
IPR2025-01463

BRIEF DESCRIPTION OF THE INVENTION

[0007] In accordance with one aspect of the invention, a mechanical fuel lockout switch for a dual fuel engine provides for the selection of a desired fuel to operate the engine. The mechanical fuel lockout switch includes a mechanical fuel valve and a fuel lockout apparatus. The mechanical fuel valve actuates between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line. The fuel lockout apparatus couples to the mechanical fuel valve ensuring individual communication of the fuel sources to the engine. The mechanical fuel lockout switch communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position.

[0008] In accordance with another aspect of the invention, a dual fuel generator and fuel delivery system includes a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line. The dual fuel generator and fuel delivery system also includes a fuel regulator system located off board the dual fuel generator to control the pressure of fuel from the pressurized fuel source and deliver the fuel at a desired pressure for operation of the generator. The fuel regulator system includes a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure. The fuel regulator system also includes a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator. The dual fuel generator and fuel delivery system further includes a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual

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

[0009] In accordance with yet another aspect of the invention, a method of assembling a mechanical fuel lockout switch for an internal combustion engine includes providing an internal combustion engine configured to operate on a fuel from a first fuel source and a different fuel from a second fuel source. The method also includes coupling a mechanical fuel valve to the internal combustion engine actuatable between a first position and a second position to selectively control fuel flow to the internal combustion engine from the first fuel source through a first fuel line and the second fuel source through a second fuel line. The method further includes coupling a fuel lockout apparatus to the mechanical fuel valve. When the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the first fuel source to the internal combustion engine and prevents the second fuel source from coupling to the internal combustion engine, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the second fuel source to couple to the internal combustion engine, and interrupts the first fuel source communication with the internal combustion engine.

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

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BRIEF DESCRIPTION OF THE DRAWINGS

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

[0012] In the drawings:

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

[0014] FIG. 2 is a detail view of a portion of the generator of FIG. 1 about a mechanical fuel lockout switch with the switch in a first position, according to an embodiment of the invention.

[0015] FIG. 3 is a detail view similar to FIG. 2 and showing the mechanical fuel lockout switch in a second position, with an LPG supply line connected thereto, according to an embodiment of the invention.

[0016] FIG. 4A is a schematic diagram of a fuel system for the dual fuel generator of FIG. 1 showing a liquid fuel source in communication with a carburetor of the generator consistent with the first position of the switch as shown in FIG. 2, according to an embodiment of the invention.

[0017] FIG. 4B is a schematic diagram of the fuel system of FIG. 4A showing a gaseous fuel source in communication with a carburetor of the generator of FIG. 1 consistent with the second position of the switch as shown in FIG. 3, according to an embodiment of the invention.

[0018] FIG. 5 is a perspective view of a fuel delivery system for the dual fuel generator of FIG. 1, according to an embodiment of the invention.

[0019] FIG. 6 is a side view of a fuel delivery system for the dual fuel generator of FIG. 1, according to an embodiment of the invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] The operating environment of the invention is described with respect to a dual fuel generator. However, it will be appreciated by those skilled in the art that the invention is equally applicable for use with any dual fuel internal combustion engine. Moreover, the invention will be described with respect to a dual fuel generator configured to operate on a liquid fuel and a gaseous fuel. However, one skilled in the art will further appreciate that the invention is equally applicable for use with other fuel combinations for dual fuel generators and internal combustion engines.

[0021] Referring to FIG. 1, a dual fuel generator 20 is coupled to a fuel delivery system 22, in accordance with an embodiment of the invention. Dual fuel generator 20 includes an internal combustion engine (not shown) within housing 21 at one end 24, operatively connected to an alternator also enclosed in housing 21 at another end 26, by conventional means. Dual fuel generator 20 is configured to operate on different fuels via either a first fuel source 28 or a second fuel source 30. In an exemplary embodiment of the invention, first fuel source 28 is a liquid fuel and second fuel source 30 is a gaseous fuel. The liquid fuel may be gasoline and the gaseous fuel may be liquid petroleum gas (LPG). Each can selectively operate the generator as desired and controlled by an operator. For instance, generator 20 may operate on gasoline for a first period of operation and then switch to LPG for a second period of operation. However, it is contemplated that dual fuel generator 20 is configured to operate on fuels other than gasoline and LPG (e.g., natural gas, biodiesel, etc.), and thus the scope of the invention is not meant to be limited strictly to a dual fuel arrangement where first fuel source 28 provides gasoline and second fuel source 30 provides LPG.

[0022] In one embodiment of the invention, dual fuel generator 20 includes a gasoline tank 32 or, generally, a liquid fuel tank, located inside cover 21 onboard generator 20 to provide gasoline to the engine as first fuel source 28. Gasoline tank 32 connects to a first fuel line to provide gasoline to the carburetor to run the engine, as will later be described with reference to FIG. 4A and 4B. Generator 20 is also coupled to a pressurized fuel container 34, or a pressurized fuel source, located off board

generator 20 to provide LPG to the engine as second fuel source 30. Pressurized fuel container 34 is coupled to generator 20 with an LPG supply hose 36. LPG supply hose 36 is coupled to a second fuel line within generator 20 to provide LPG to the carburetor to run the engine. Dual fuel generator 20 includes a mechanical fuel lockout switch 38 for selecting a desired fuel to be provided to the engine. The mechanical fuel lockout switch 38 is actuated to select first fuel source 28 when in a first position, as shown in FIG. 2, and alternately to select second fuel source 30 when in a second position, as shown in FIG. 3.

[0023] Referring back to FIG. 1, in an exemplary embodiment, fuel 30 from pressurized fuel container 34 is regulated using a fuel regulator system 39 for delivery to the engine. Fuel regulator system 39 includes one or more pressure regulators that reduce and control the pressure of the fuel from pressurized fuel container 34 and delivers fuel at a desired pressure for operation of the engine. Fuel regulator system 39 has an inlet 41 operatively coupled to a service valve 40 of pressurized fuel container 34 and an outlet 43 coupled to LPG supply hose 36. Fuel regulator system 39 includes a primary pressure regulator 42 coupled to pressurized fuel container 34 and a secondary pressure regulator 44. Primary pressure regulator 42 protects downstream components from high pressure of pressurized fuel container 34. Primary pressure regulator 42 receives LPG through service valve 40 of pressurized fuel container 34 and reduces the pressure of the LPG to a first stage. In one embodiment of the invention, the first stage may be delivered directly to generator 20 at a pressure required for operation of the engine.

[0024] In an exemplary embodiment of the invention, fuel regulator system 39 includes secondary pressure regulator 44 coupled to the outlet of primary pressure regulator 42 in order to use standard "off-the-shelf" components. Typically, the primary pressure regulator is mounted on the LPG tank, while the secondary pressure regulator is mounted on the component using the fuel, such as an engine or grill. Here, since generator 20 can be used as a gasoline only generator, secondary pressure regulator 44 is mounted off-board the generator to reduce size and cost of the generator. Secondary pressure regulator 44 receives LPG from primary pressure regulator 42 and further

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reduces the pressure of LPG to a second stage to be delivered to generator 20. In a system with two regulators, primary pressure regulator 42 regulates fuel received from pressurized fuel container 34 and reduces the pressure of the fuel to a level required for operation of secondary pressure regulator 44. Secondary pressure regulator 44 regulates fuel received from primary pressure regulator 42 and further reduces the pressure of the fuel to a level required for operation of generator 20. In addition, primary pressure regulator 42 may compensate for varying tank pressure as fuel is depleted while secondary pressure regulator 44 may compensate for varying demand from generator 20.

[0025] In accordance with an exemplary embodiment of the invention, fuel regulator system 39 includes both the primary and secondary regulators, or a custom single regulator, but in any case is located remotely, or off-board, from dual fuel generator 20. Fuel regulator system 39 may be directly mounted to pressurized fuel container 34 using a regulator mounting bracket 46. Regulator mounting bracket 46 has mounting locations for primary pressure regulator 42 and secondary pressure regulator 44. Regulator mounting bracket 46 also has a securing mechanism 48 to secure regulator mounting bracket 46 to pressurized fuel container 34.

[0026] In another embodiment of the invention, primary pressure regulator 42 is mounted on regulator mounting bracket 46 while secondary pressure regulator 44 could be mounted on or near generator 20. In yet another embodiment of the invention, a dual stage regulator may regulate the fuel received from pressurized fuel container 34 and deliver fuel at a pressure required for operation of generator 20. Such a dual stage regulator may regulate the fuel to the second stage within a single structure. The dual stage regulator may be mounted directly on fuel container 34.

[0027] Referring to FIG. 2, a detail view of a portion of generator 20 of FIG. 1 depicts mechanical fuel lockout switch 38 in a first position 38(a), in accordance with an embodiment of the invention. In this position, mechanical fuel lockout switch 38 provides gasoline flow from gasoline tank 32 to the engine while preventing connection of an LPG supply line to fuel inlet 59 of the second fuel line, as will later be discussed

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in detail with reference to FIGS. 4A and 4B. Still referring to FIG. 2, mechanical fuel lockout switch 38 provides a combination liquid fuel shutoff valve and a gaseous fuel supply lockout that prevents simultaneous delivery of fuel to the engine from gasoline tank 32 and pressurized fuel container 34, FIG. 1. As such, mechanical fuel lockout switch 38 provides a fuel selector to ensure only the selected fuel is provided to dual fuel generator 20.

[0028] Mechanical fuel lockout switch 38, FIG. 2, includes mechanical fuel valve 54 actuatable between first position 38(a) as shown in FIG. 2 and second position 38(b) as shown in FIG. 3 to selectively control fuel flow to the dual fuel engine from first fuel source 28 through a first fuel line and second fuel source 30 through a second fuel line 36. Mechanical fuel lockout switch 38 may also include fuel lockout apparatus 58 coupled to mechanical fuel valve 54 to communicate fuel sources individually to generator 20. In one embodiment of the invention, fuel lockout apparatus 58 communicates first fuel source 28 to the engine by actuating mechanical fuel valve 54 to first position 38(a) to open the first fuel line as shown in FIG. 2, and communicates second fuel source 30 to the engine by actuating mechanical fuel valve 54 to second position 38(b) to open communication of the second fuel source 30 to the engine as shown in FIG. 3. Referring back to FIG. 2, when mechanical fuel valve 54 is in first position 38(a), fuel lockout apparatus 58 communicates first fuel source 28 to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine.

[0029] In an exemplary embodiment of the invention, mechanical fuel valve 54 controls the flow of LPG to the engine by actuating fuel lockout apparatus 58 to block or unblock fuel inlet 59 for the second fuel source. Mechanical fuel valve 54 is coupled to the first fuel line, as shown in FIGS. 4A and 4B, and therefore can control the flow of gasoline to the engine by opening and closing the first fuel line. When the mechanical fuel valve 54, FIG. 2, is in the first position 38(a), gasoline flows from the gasoline tank to the engine and the fuel lockout apparatus 58 blocks the fuel inlet 59. Accordingly, fuel lockout apparatus 58 prevents LPG flow to generator 20 when the mechanical fuel valve 54 is in first position 38(a) wherein the engine is operated on gasoline.

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[0030] Mechanical fuel valve 54 includes a fuel valve handle 56 to control the opening and closing of the valve. Fuel valve handle 56 is movable between first position 38(a) as shown in FIG. 2 and second position 38(b) as shown in FIG. 3. Mechanical fuel valve 54 opens the first fuel line (to enable liquid fuel flow to the engine) when fuel valve handle 56 is in the first position, and mechanical fuel valve 54 closes the first fuel line (to prevent liquid fuel flow to the engine) when fuel valve handle 56 is in the second position. Thus, when fuel valve handle 56 is in first position 38(a) as shown in FIG. 2, mechanical fuel valve 54 opens the first fuel line and allows gasoline from gasoline tank 32 to flow to the engine.

[0031] Fuel valve handle 56 is coupled to fuel lockout apparatus 58. Fuel valve handle 56 actuates with fuel lockout apparatus 58 to prevent LPG flow to generator 20 when gasoline flow to the generator is enabled. Fuel lockout apparatus 58 is controlled by fuel valve handle 56 so that moving fuel valve handle 56 to the first position causes fuel lockout apparatus 58 to block fuel inlet 59 for LPG, and moving fuel valve handle 56 to the second position causes fuel lockout apparatus 58 to unblock fuel inlet 59 for LPG.

[0032] In an exemplary embodiment of the invention, fuel valve handle 56 rotates between the first position and the second position and fuel lockout apparatus 58 is rigidly coupled to the rotating handle. Fuel lockout apparatus 58 may include a fuel inlet cover 61, which may be a flange, coupled to fuel valve handle 56 so that fuel inlet cover 61 rotates with the handle. Fuel inlet cover 61 extends radially outward from fuel valve handle 56 and sweeps over fuel inlet 59 for LPG as fuel valve handle 56 rotates. That is, fuel inlet cover 61 rotates transversely across fuel inlet 59 and blocks access thereto. Accordingly, fuel inlet cover 61 prevents LPG flow to generator 20 when fuel valve handle 56 is in first position 38(a) to allow gasoline to run the engine.

[0033] Referring to FIG. 3, a detail view of a portion of generator 20 of FIG. 1 depicts mechanical fuel lockout switch 38 in a second position 38(b), in accordance with an embodiment of the invention. In this position, the mechanical fuel lockout switch 38 provides a disconnect to stop gasoline flow from gasoline tank 32 to the

engine while allowing connection of LPG supply hose 36 to fuel inlet 59 of the second fuel line. FIG. 3 further shows LPG supply hose 36 coupling second fuel source 30 to generator 20 to deliver LPG to run the generator.

[0034] Mechanical fuel lockout switch 38 includes mechanical fuel valve 54 coupled to fuel lockout apparatus 58 to prevent gasoline flow to generator 20 when LPG from the LPG service hose 36 is supplied to the engine. In one embodiment of the invention, actuation of mechanical fuel valve 54 to second position 38(b) causes fuel lockout apparatus 58 to allow communication of second fuel source 30 to the dual fuel engine, and interrupts the first fuel source 28 communication with the dual fuel engine. The position of fuel lockout apparatus 58 prevents the fuel valve handle 56 from moving to first position 38(a) (FIG. 2) while LPG supply hose 36 is connected to generator 20.

[0035] A quick-disconnect hose coupling 50, also referred to as a quick-connect hose coupling, connects LPG supply hose 36 to generator 20 so that LPG supply hose 36 may be quickly attached and detached from generator 20. Hose coupling 50 has a first end 50a mounted on the external surface of generator 20 and coupled to supply the second fuel to the engine. Hose coupling 50 has a second end 50b coupled to the outlet of LPG supply hose 36. Hose coupling 50 has a valve that opens when the couplings are engaged and closes when the couplings are disengaged. As such, quick-disconnect hose coupling 50 automatically opens when connected to enable fuel flow from LPG supply hose 36 to the engine. Hose coupling 50 automatically disconnects fluid communication when disconnected. Accordingly, when the supply hose is detached from generator 20, the coupling 50 is automatically closed so that fuel does not escape and unwanted air does not enter the fuel system.

[0036] In one embodiment, fuel inlet cover 61 is coupled to fuel valve handle 56 so that it is spaced apart from the surface of generator 20 to provide clearance for first end 50a of the quick-disconnect hose coupling 50 that protrudes from the surface of generator 20. As shown in FIG. 2, fuel inlet cover 61 blocks off first end 50a of the quick-disconnect hose coupling when fuel valve handle 56 is rotated to first position 38(a) to enable gasoline flow so that fuel inlet cover 61 prevents connection of LPG

supply hose 36 (FIG. 3) to generator 20. As shown in FIG. 3, fuel inlet cover 61 uncovers first end 50a of the quick-disconnect hose coupling 50 when fuel valve handle 56 is rotated to second position 38(b) to disable gasoline flow so that fuel inlet cover 61 permits connection of LPG supply hose 36 to generator 20.

[0037] To operate generator 20 on LPG, fuel valve handle 56 is turned to second position 38(b) to disable the flow of gasoline to the engine and to expose first end 50a of hose coupling 50 on generator 20. LPG supply hose 36 is then connected to generator 20 via hose coupling 50 to enable the flow of LPG to the engine. To operate generator 20 on gasoline, LPG supply hose 36 is disconnected from generator 20 via hose coupling 50 to disable the flow of LPG to the engine and to unblock fuel valve handle 56 from rotating to the first position. As shown in FIG. 2, fuel valve handle 56 is then turned to first position 38(a) to enable the flow of gasoline to generator 20.

[0038] Referring to FIG. 4A, a schematic diagram of a fuel system for a dual fuel engine shows mechanical fuel lockout switch 38 in first position 38(a) to provide communication between the first fuel source 28 and dual fuel carburetor 62, according to an embodiment of the invention. Mechanical fuel lockout switch 38 prevents communication between second fuel source 30 and dual fuel carburetor 62 when the switch is in first position 38(a). In one embodiment of the invention, first fuel source 28 includes a gasoline tank 32 to provide gasoline to carburetor 62 through a first fuel line 66, and second fuel source 30 includes a propane or LPG tank 68 to provide propane or LPG to carburetor 62 through a second fuel line 70. Accordingly, first fuel line 66 may be a liquid fuel line and second fuel line 70 may be a gaseous fuel line.

[0039] Mechanical fuel lockout switch 38 includes a mechanical fuel valve 54 actuatable between first position 38(a) as shown in FIG. 4A and second position 38(b) as shown in FIG. 4B to selectively control fuel flow to the dual fuel engine from first fuel source 28 through first fuel line 66 and second fuel source 30 through second fuel line 70. Referring back to FIG. 4A, mechanical fuel valve 54 selectively controls fuel flow through first fuel line 66 by opening the line when the mechanical fuel lockout switch 38 actuates to first position 38(a). Mechanical fuel valve 54 may be coupled to

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fuel lockout apparatus 58 that actuates with mechanical fuel valve 54 to block and unblock fuel inlet 59 of second fuel line 70. First end 50a of the quick-disconnect hose coupling is located at fuel inlet 59 and a mating end 50b of the quick-disconnect hose coupling is coupled to the propane or LPG tank 68. Actuation of mechanical fuel valve 54 to first position 38(a) causes fuel lockout apparatus 58 to block fuel inlet 59 to prevent coupling the first end 50a and second end 50b of the quick-disconnect hose coupling together, and actuation of mechanical fuel valve 54 to another position causes fuel lockout apparatus 58 to unblock fuel inlet 59 to permit attaching first end 50a and second end 50b together.

[0040] In one embodiment of the invention, a fuel cut solenoid 63 couples to carburetor 62 to regulate liquid fuel flow into a main nozzle within the carburetor. Fuel cut solenoid 63 is advantageous to control liquid fuel flow downstream of a float bowl in the carburetor and can stop fuel flow to the engine immediately after ignition shutdown. As such, fuel cut solenoid 63 prevents the engine from drawing in fuel from the float bowl while the engine shuts off. Fuel cut solenoid 63 also traps fuel in the float bowl to eliminate delay in filling the bowl when starting the engine on liquid fuel, and prevents liquid fuel flow from the float bowl to the engine when starting on gaseous fuel.

[0041] Fuel cut solenoid 63 may regulate fuel flow through multiple fuel lines in carburetor 62 that provide fuel from the float bowl to the engine. For instance, carburetor 62 may have a main fuel line and an idle fuel line that receive fuel from the float bowl. Fuel cut solenoid 63 may control fuel flow through all of the fuel lines that receive fuel from the float bowl or may regulate only some of the fuel lines. As such, fuel cut solenoid 63 may block fuel flow through the main fuel line while small amounts of fuel can flow through the idle fuel line.

[0042] Fuel cut solenoid 63 preferably operates as a normally closed valve that opens when powered by a 12 volt battery 65, although fuel cut solenoid 63 may also be operated as a normally open valve. The normally closed valve is opened for gasoline mode to allow gasoline flow to the engine and closed for LPG mode to prevent gasoline

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flow to the engine. Fuel cut solenoid 63 is operated by an electrical switch 67 which may be mechanically actuated and controlled by mechanical fuel lockout switch 38. As such, actuation of mechanical fuel lockout switch 38 to first position 38(a) closes electrical switch 67 to power and open fuel cut solenoid 63 as represented in FIG. 4A, and actuation of mechanical fuel lockout switch 38 to second position 38(b) opens electrical switch 67 to interrupt power and close fuel cut solenoid 63 as represented in FIG. 4B.

[0043] Referring to FIG. 4B, a schematic diagram of a fuel system for a dual fuel engine shows mechanical fuel lockout switch 38 in second position 38(b) to provide communication between second fuel source 30 and dual fuel carburetor 62, according to an embodiment of the invention. Mechanical fuel lockout switch 38 prevents communication between first fuel source 28 and dual fuel carburetor 62 when the switch is in second position 38(b). The dual fuel engine has a first fuel line 66 to provide fuel from first fuel source 28 to carburetor 62 and a second fuel line 70 to provide fuel from second fuel source 30 to carburetor 62.

[0044] Mechanical fuel lockout switch 38 includes mechanical fuel valve 54 that selectively controls fuel flow through first fuel line 66 by closing the line when mechanical fuel lockout switch 38 actuates to second position 38(b). Mechanical fuel lockout switch 38 may also include a mechanical lockout apparatus 58 to block and unblock fuel inlet 59 of the second fuel line 70. Fuel inlet 59 may include first end 50a of the quick-connect hose coupling mounted on the generator and coupled to second fuel line 70. Second end 50b of the quick-connect hose coupling is coupled to the outlet of second fuel source 30, and the first end 50a mates with second end 50b to quickly attach propane or LPG tank 68 to second fuel line 70. Fuel lockout apparatus 58 may also hold mechanical fuel lockout switch 38 in second position 38(b) when the propane or LPG tank 68 is coupled to the engine via the ends 50a, 50b of the quick-connect hose coupling.

[0045] Fuel cut solenoid 63 couples to carburetor 62 to regulate liquid fuel flow through the carburetor as described with respect to FIG. 4A. FIG. 4B shows electrical

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switch 67 opened to interrupt power and close fuel cut solenoid 63 for LPG mode when mechanical fuel lockout switch 38 is in second position 38(b).

[0046] FIG. 4A and 4B depict an embodiment where mechanical fuel valve 54 operates along first fuel line 66 to provide a flow path for first fuel source 28 to carburetor 62 when the valve is in first position 38(a). That is, mechanical fuel valve 54 may control a single fuel line that runs through the valve while operating fuel lockout apparatus 58 to control fuel flow through second fuel line 70. Embodiments of the invention also contemplate mechanical fuel valve 54 configured to operate along second fuel line 70 to provide a flow path for second fuel source 30 to carburetor 62 when the valve is in second position 38(b). Mechanical fuel valve 54 may be configured to control multiple fuel lines that run through the valve according to embodiments of the invention.

[0047] Referring now to FIG. 5, a perspective view of fuel delivery system 22 for dual fuel generator 20 of FIG. 1 is shown, in accordance with an embodiment of the invention. Fuel delivery system 22 includes a mounting arrangement for fuel regulator system 39. The mounting arrangement includes regulator mounting bracket 46 for mounting fuel regulator system 39. Regulator mounting bracket 46 extends around the outer periphery of collar 136 on pressurized fuel container 34. Regulator mounting bracket 46 has securing mechanism 48 to secure to collar 136. In one embodiment, securing mechanism 48 is a rigid component that extends inward from regulator mounting bracket 46 with a slot for receiving collar 136 to hold regulator mounting bracket 46 to collar 136.

[0048] Regulator mounting bracket 46 provides mounting locations for pressure regulators. In one embodiment, regulator mounting bracket 46 is made of sheet metal bent in two locations to provide a central panel 138, a first outer panel 140, and a second outer panel 142 for mounting the regulators. The panels may be angled from each other such that regulator mounting bracket 46 fits around collar 136. Primary pressure regulator 42 mounts on first outer panel 140 and secondary pressure regulator 44 mounts on second outer panel 142. The panels are sized according to their respective

regulators. Accordingly, second outer panel 142 is larger than first outer panel 140 if secondary pressure regulator 44 is larger than primary pressure regulator 42. Panels 140, 142 have fasteners or openings to receive fasteners to couple respective regulators 42, 44 to the panels. Regulator mounting bracket 46 rests on top of pressurized fuel container 34 and engages the periphery of collar 136 to support fuel regulator system 39 on the container.

[0049] In one embodiment of the invention, primary pressure regulator 42 couples to two ninety degree elbows 144, 145 to reach around collar 136 in order to couple to service valve 40. The two elbows 144, 145 are joined by a hose or pipe 146 that leads from elbow 144 at service valve 40 to elbow 145 at the outer periphery of collar 136. The outlet of primary pressure regulator 42 couples to a hose 148 that extends to another ninety degree elbow 150 coupled to the inlet of secondary pressure regulator 44. Secondary pressure regulator 44 couples to LPG supply hose 36. Pressurized fuel container 34 may be strapped to a dolly 152.

[0050] Referring now to FIG. 6, a side view of another fuel delivery system 22 for dual fuel generator 20 of FIG. 1 is shown, in accordance with an embodiment of the invention. Fuel delivery system 22 includes a mounting arrangement for fuel regulator system 39. The mounting arrangement includes a regulator mounting structure 154 for mounting fuel regulator system 39 to pressurized fuel container 34. Regulator mounting structure 154 includes a cylinder 156 that surrounds the circumference of pressurized fuel container 34 to secure regulator mounting structure 154 radially along the circumference of pressurized fuel container 34. Cylinder 156 couples to a dome 158 to support cylinder 156 relative to the top of pressurized fuel container 34. Dome 158 has a central opening 160 through which collar 136 of pressurized fuel container 34 extends. Collar 136 of pressurized fuel container 34 extends through dome 158 so that service valve 40 is easily accessible from above regulator mounting structure 154 and so that dome 158 sits on pressurized fuel container 34 around collar 136.

[0051] Regulator mounting structure 154 supports pressure regulators around the outer circumference of cylinder 156. In some embodiments of the invention, a dual

stage pressure regulator 162 functions as both a primary pressure regulator and a secondary pressure regulator in a single integral component, and dual stage pressure regulator 162 may be mounted on regulator mounting structure 154. In other embodiments in of the invention, primary pressure regulator 42 (FIG. 5) is mounted to service valve 40 while secondary pressure regulator 44 (FIG. 5) is mounted on regulator mounting structure 154. Alternatively, both primary pressure regulator 42 (FIG. 5) and secondary pressure regulator 44 (FIG. 5) may be mounted on regulator mounting structure 154.

[0052] Fuel regulator system 39 may be coupled to service valve 40 by a flexible connector called a pigtail 164. Pigtail 164 absorbs shock in the system from pressure surges and from movement of downstream components. Pigtail 164 can be looped to conserve space and therefore pressurized fuel container 34 is referred to as an LPG pig. Accordingly, regulator mounting structure 154 is referred to as a pig hat because it fits on the LPG pig. Pressurized fuel container 34 may be secured to a platform or mobile cart 64 for stability or transportation. In another embodiment, a regulator mounting device, including regulator mounting structure 154 or regulator mounting bracket 46 (FIG. 5), is secured directly to a platform or a mobile cart.

[0053] Beneficially, embodiments of the invention provide for a mechanical fuel lockout switch to ensure that two fuels are not simultaneously delivered to a dual fuel internal combustion engine. Embodiments of the invention also provide for a dual fuel generator with a remotely mounted gaseous fuel regulator system.

[0054] Therefore, according to one embodiment of the invention, a mechanical fuel lockout switch for a dual fuel engine includes a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line and a second fuel source through a second fuel line. The mechanical fuel lockout switch also includes a fuel lockout apparatus coupled to the mechanical fuel valve. The mechanical fuel lockout switch communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the

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mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position.

[0055] According to another embodiment of the invention, a dual fuel generator and fuel delivery system includes a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line. The dual fuel generator and fuel delivery system also includes a fuel regulator system located off board the dual fuel generator. The fuel regulator system includes a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure. The fuel regulator system also includes a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator. The dual fuel generator and fuel delivery system further includes a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

[0056] According to yet another embodiment of the invention, a method of assembling a mechanical fuel lockout switch for an internal combustion engine includes providing an internal combustion engine configured to operate on a fuel from a first fuel source and a different fuel from a second fuel source. The method also includes coupling a mechanical fuel valve to the internal combustion engine actuatable between a first position and a second position to selectively control fuel flow to the internal combustion engine from the first fuel source through a first fuel line and the second fuel source through a second fuel line. The method further includes coupling a fuel lockout apparatus to the mechanical fuel valve. When the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the first fuel source to the internal combustion engine and prevents the second fuel source from coupling to the internal combustion engine, and actuation of the mechanical fuel valve to the second position

causes the fuel lockout apparatus to permit the second fuel source to couple to the internal combustion engine, and interrupts the first fuel source communication with the internal combustion engine.

[0057] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

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CLAIMS

What is claimed is:

1. A generator and fuel delivery system comprising:

a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage; and

regulate the reduced pressure gaseous fuel in the second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

2. The generator and fuel delivery system of claim 1 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

3. The generator and fuel delivery system of claim 2 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

4. The generator and fuel delivery system of claim 1 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

5. The generator and fuel delivery system of claim 4 further comprising a mechanical fuel valve actuatable between a first position and a second position to

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selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

6. The generator and fuel delivery system of claim 5 further comprising a fuel lockout apparatus coupled to the mechanical fuel valve;

wherein, when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator; and

wherein, when the mechanical fuel valve is in the second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

7. The generator and fuel delivery system of claim 1, wherein the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator; and

wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including:

a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

8. The generator and fuel delivery system of claim 7, further comprising a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.

9. The generator and fuel delivery system of claim 8, wherein the primary pressure regulator is mounted on the regulator mounting device.

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10. The generator and fuel delivery system of claim 9, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

11. A generator and fuel delivery system comprising:

a generator configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off-board the generator and comprising a first stage and a second stage, the fuel regulator system configured to:

regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage; and

regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator;

wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.

12. The generator and fuel delivery system of claim 11 wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.

13. The generator and fuel delivery system of claim 12 wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.

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14. The generator and fuel delivery system of claim 11 wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.

15. The generator and fuel delivery system of claim 14 further comprising a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

16. A dual fuel generator and fuel delivery system comprising:

a dual fuel generator configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising:

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

a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator;

wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.

17. The dual fuel generator and fuel delivery system of claim 16 wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.

18. The dual fuel generator and fuel delivery system of claim 16, further comprising a quick-connect hose coupling including:

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a first end coupled to an outlet of the secondary pressure regulator; and

a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.

19. The dual fuel generator and fuel delivery system of claim 16, wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

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

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ABSTRACT

A generator and off-board fuel delivery system is disclosed. The generator is configured to operate on one or more fuels, including on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line. A fuel regulator system is located off board the generator and is configured to regulate the gaseous fuel supplied from the pressurized fuel source in a first stage, with the gaseous fuel regulated down to a reduced pressure in the first stage. A second stage of the fuel regulator system regulates the reduced pressure gaseous fuel, with the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the generator.

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

Title of Invention	DUAL FUEL LOCKOUT SWITCH FOR GENERATOR ENGINE

As the below named inventor, I hereby declare that:

This declaration is directed to:

☑ The attached application, or

☐ United States application or PCT international application number _____

filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Mark J. Sarder Date (Optional): _____

Signature: Mark J. Sarder

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Aleko D. Sotiriades Date (Optional): _____

Signature: Aleko D Sotiriades

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: James J. Dehn Date (Optional): 6/12/2015

Signature: James J Dehn

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Leigh Jenison Date (Optional): 6.12.2015

Signature: Leigh Jenison

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

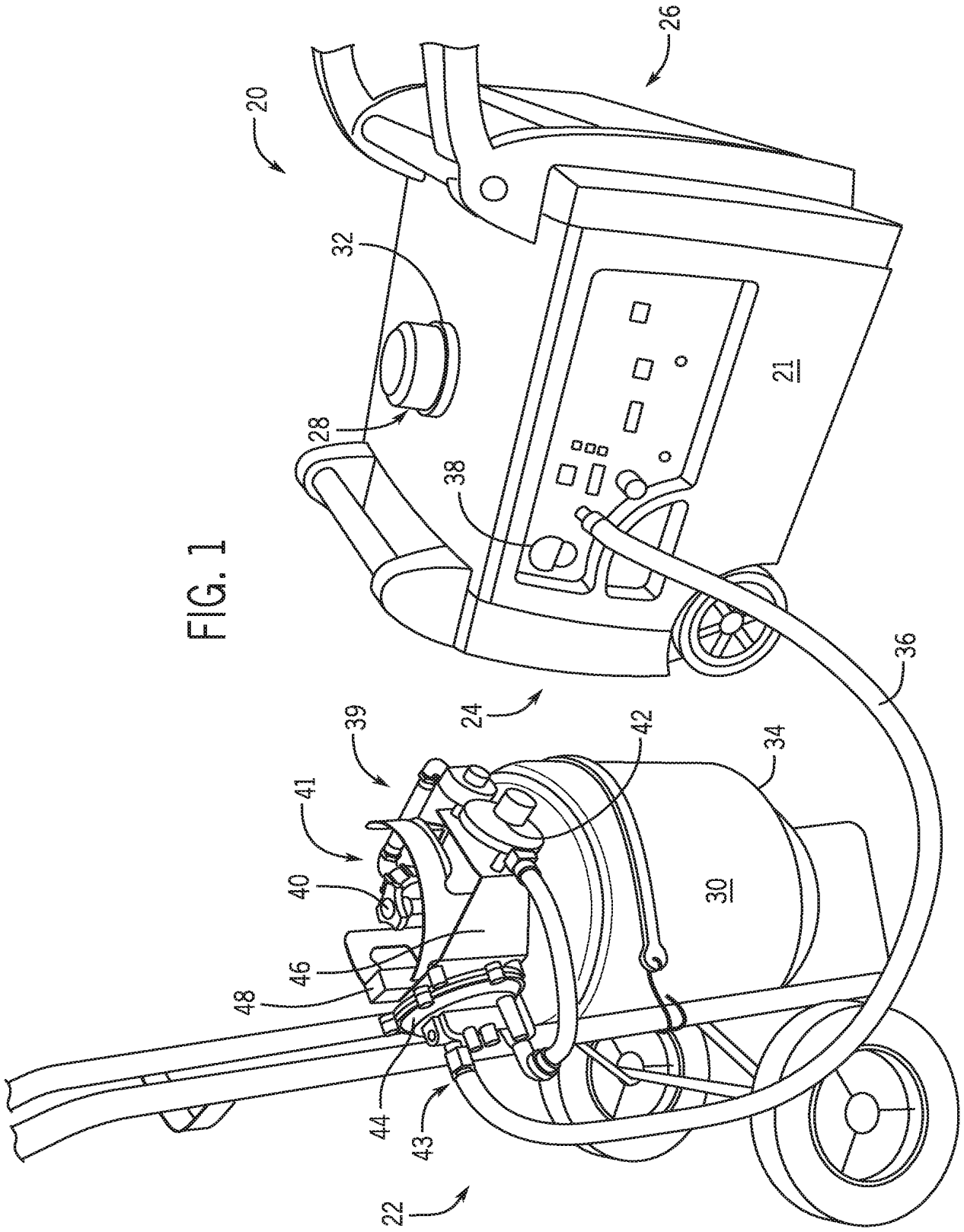


FIG. 1

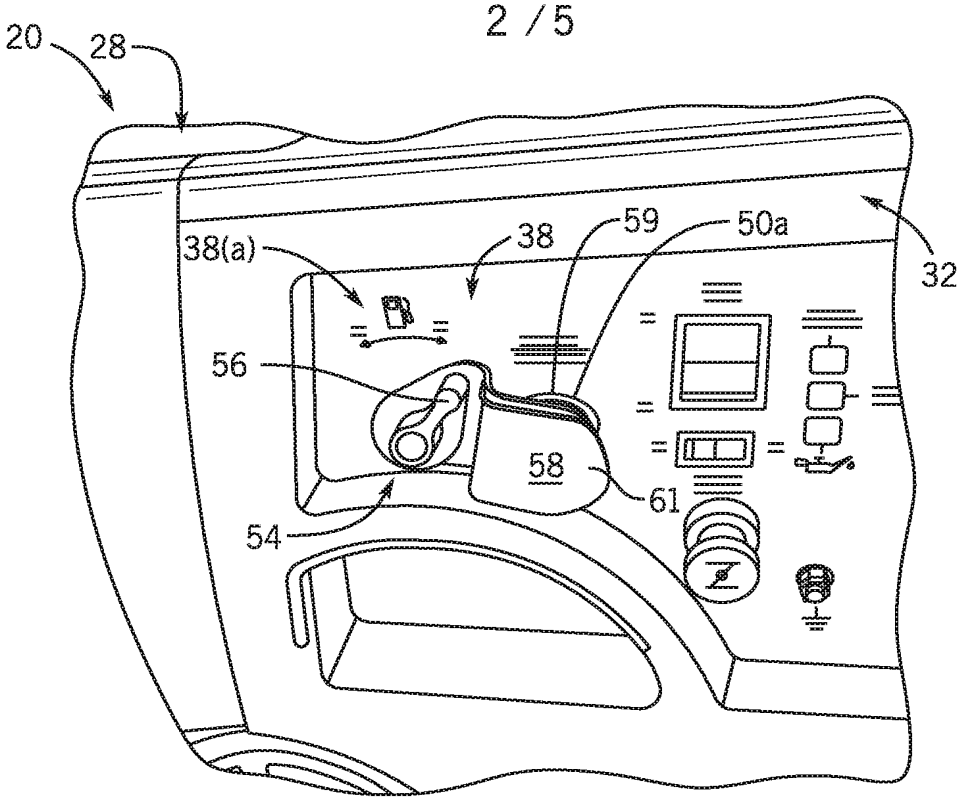

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FIG. 2

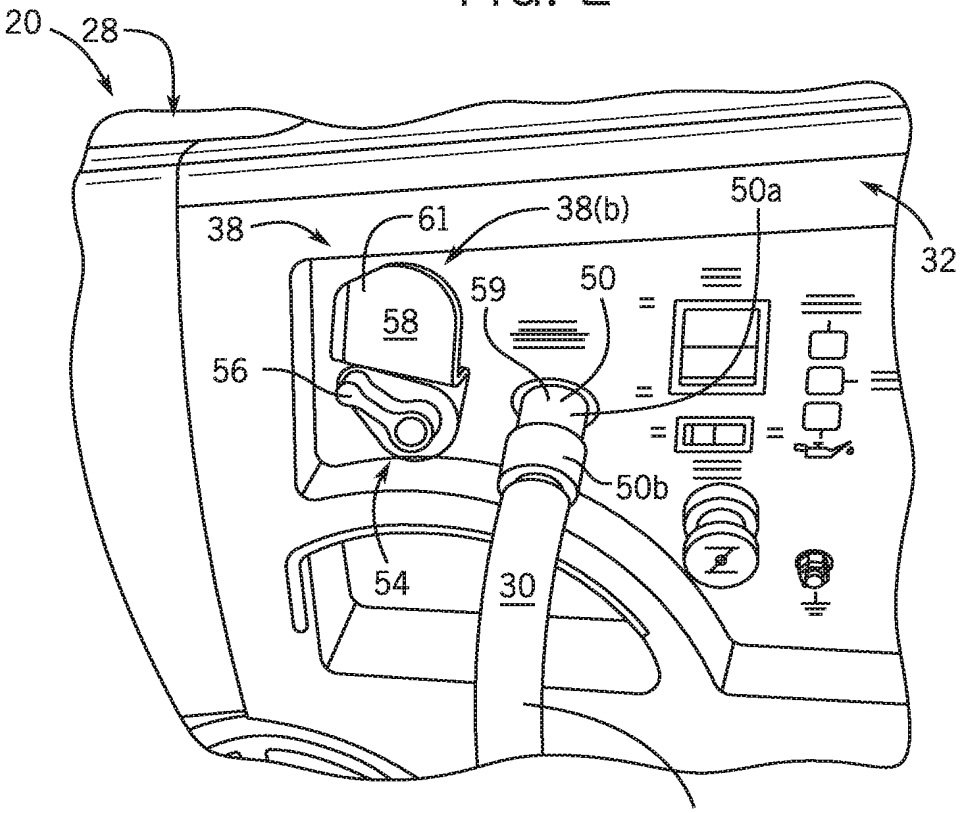

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50b
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FIG. 3

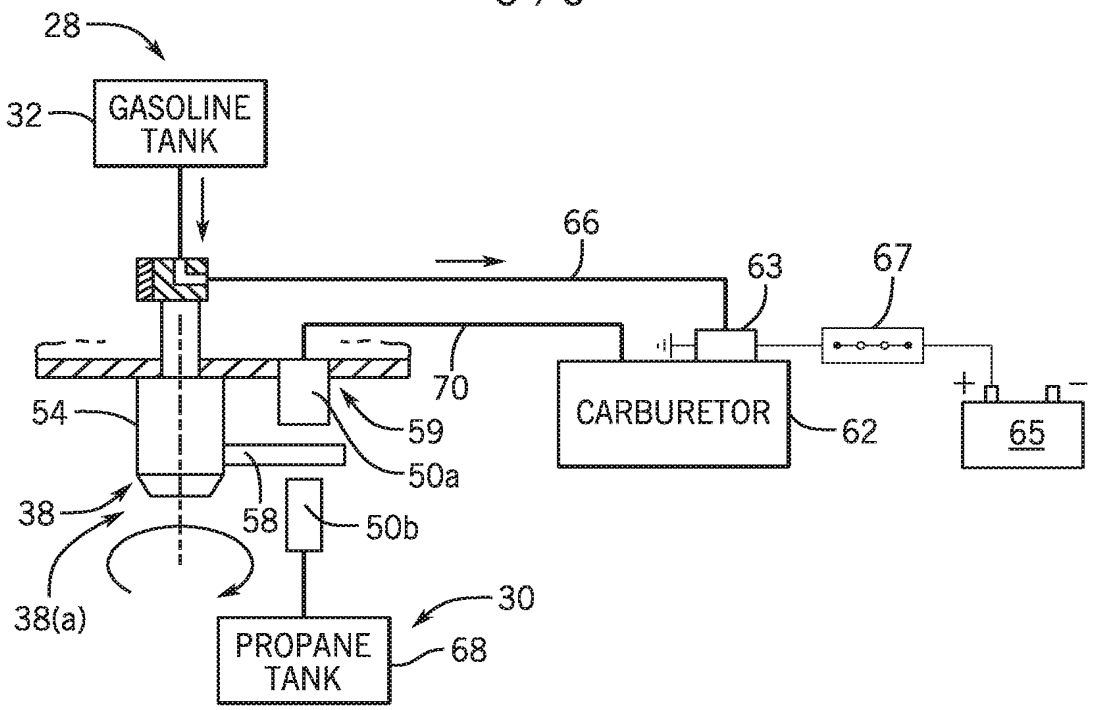

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CARBURETOR
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PROPANE TANK
68

FIG. 4A

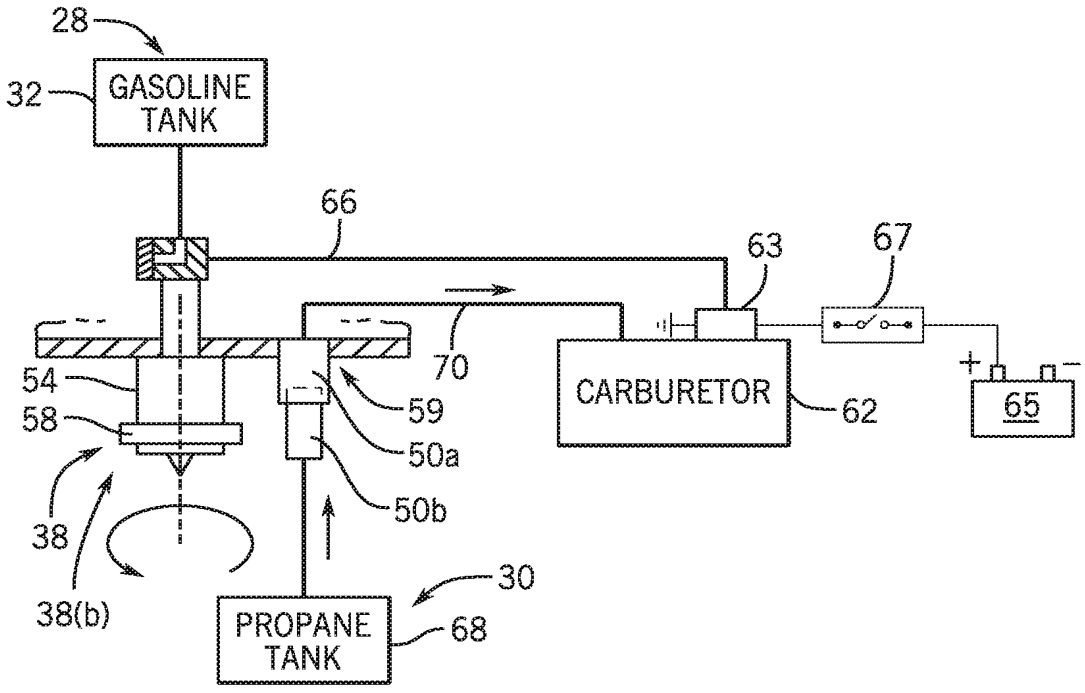

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PROPANE TANK
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FIG. 4B

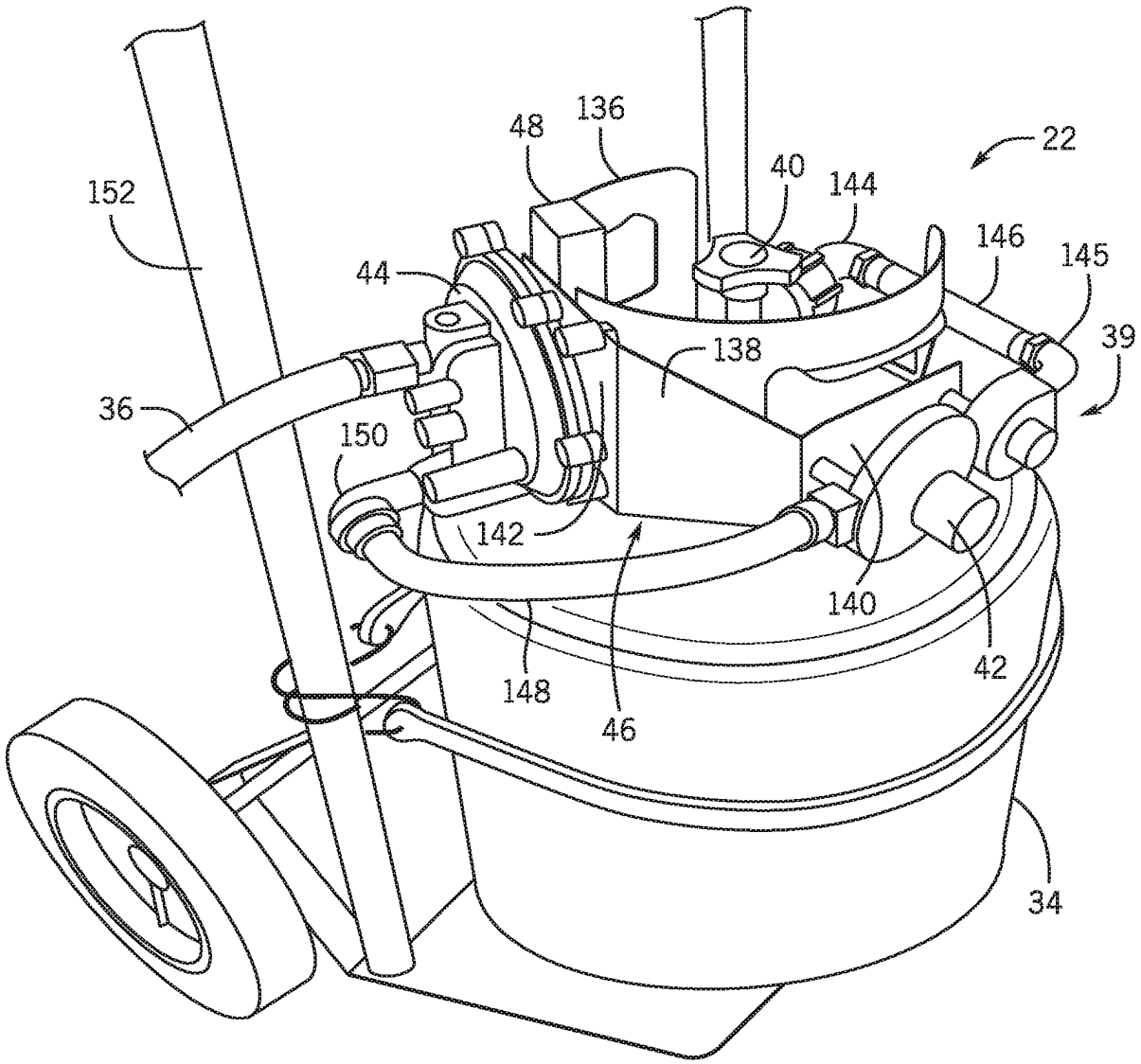


FIG. 5

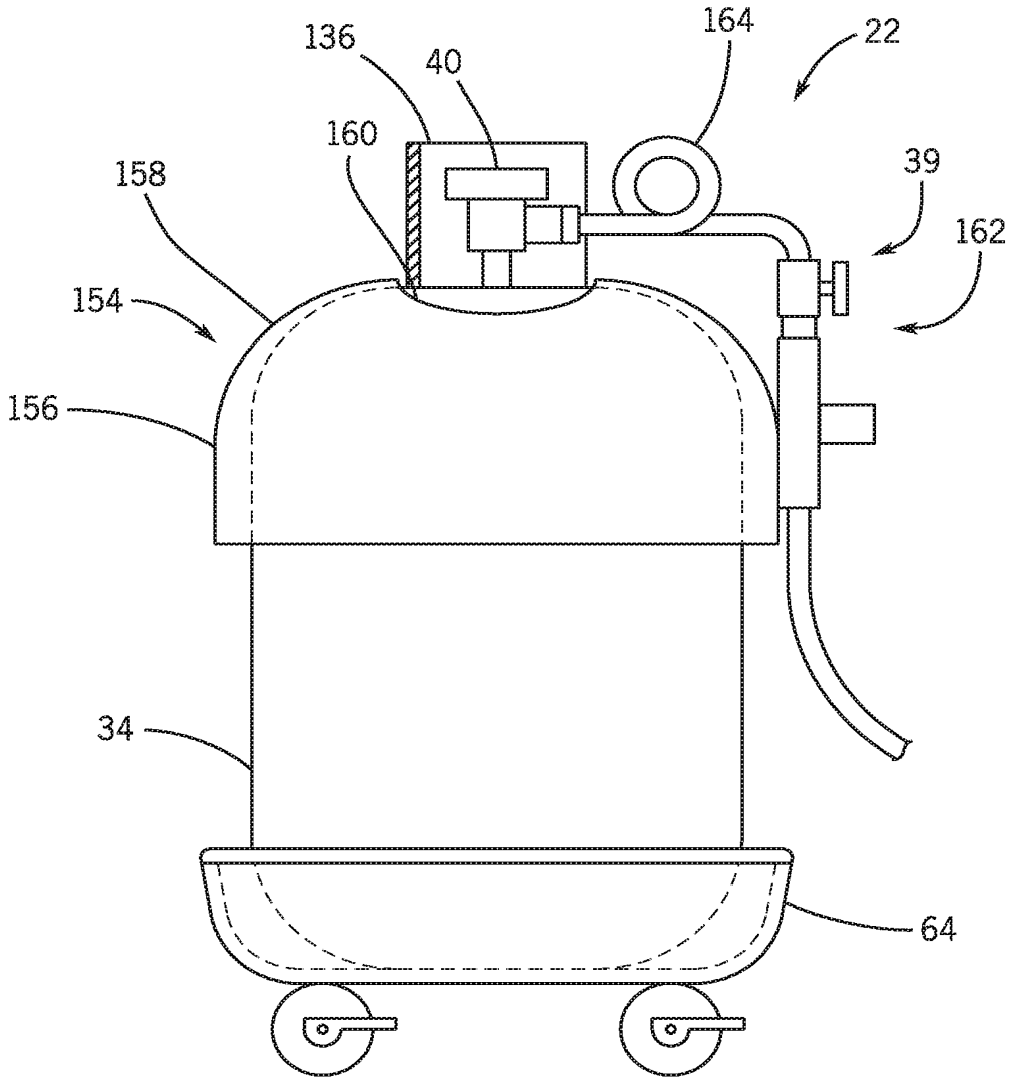


FIG. 6