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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	07/07/2020	10703949	821920-1033	5897

24504 7590 06/17/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

## 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 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Kenneth M. Ponder, Cumming, GA;  
R421A LLC, Alpharetta, GA;  
Steffan Thomas, Buckhead, GA, Deceased;

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

## **U.S.PATENTS**

[Remove](#)

Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
Change(s) applied to document, /M.H.E./ 5/22/2020	1	4983312		<del>1992-01-08</del> 01/1991	Tamura et al.	
	2	6606868	B1	2003-08-19	Powell et al.	
	3	6863840	B2	2005-03-08	Goble	
	4	5688432	A	1997-11-18	Pearson	
	5	6271184	B1	2001-08-07	Seebauer et al.	
	6	5254280	A	1993-10-19	Thomas et al.	
	7	5384057	A	1995-01-24	Wilczek	
	8	4971712		1990-11-20	Gorski et al.	

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

Kenneth M. Ponder

Group Art Unit: 1761

Serial No.: 15/989,655

Examiner: Hardee, John R.

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

**RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS**  
**MAILED May 26, 2020 (Notice of Allowance Mailed)**

MAIL STOP: ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Notice to File Corrected Application Papers mailed May 26, 2020, (Notice of Allowance mailed May 18, 2020, Issue Fee paid May 19, 2020), Applicants submit herewith Replacement Sheets for the figures as filed with the application and request that the Replacement Sheets be accepted for at least the following reasons.

In the Notice to File Corrected Application Papers, the Office asserts the following sole drawing deficiency: “The characters of the lines, numbers and letters in FIG(s) 1, 2 is poor.” Applicants submit the present Replacement Sheets overcome the noted deficiencies. Applicants further note the same figures were accepted and printed in parent Application Serial No. 12/961,045, now U.S. Patent No. 8,197,706.

For at least the above reasons, Applicants believe the remarks above and Replacement Sheets for FIG(s) 1, 2 submitted herewith to be fully responsive to the Notice to File Corrected Application Papers mailed May 26, 2020, (Notice of Allowance mailed May 18, 2020, Issue Fee paid May 19, 2020), within the time period set forth in such. The Commissioner is authorized to charge Deposit Account 20-0778 for any deficiencies or credit any over payments.

Respectfully submitted,

**THOMAS | HORSTEMEYER, LLP**

By: /Todd Deveau/

**Todd Deveau**

**Registration No. 29,526**

**THOMAS| HORSTEMEYER, L.L.P.**  
**Customer Number 24504**



FIG. 1

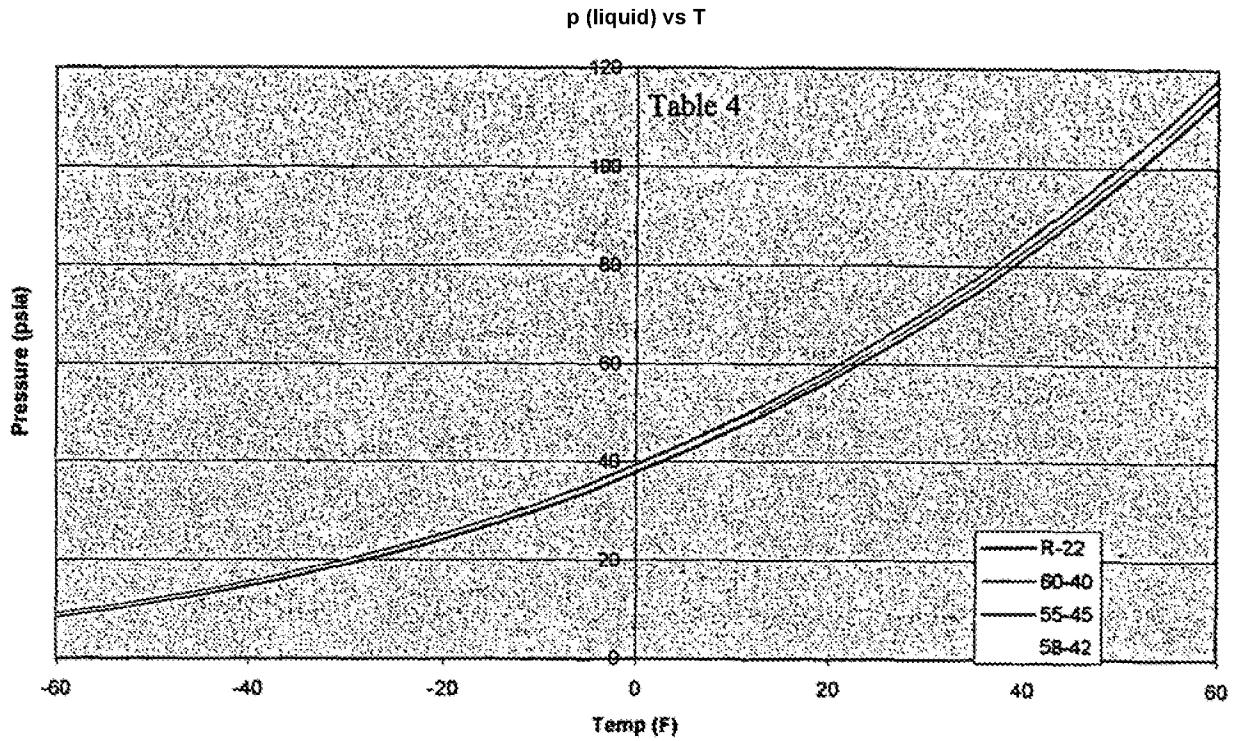
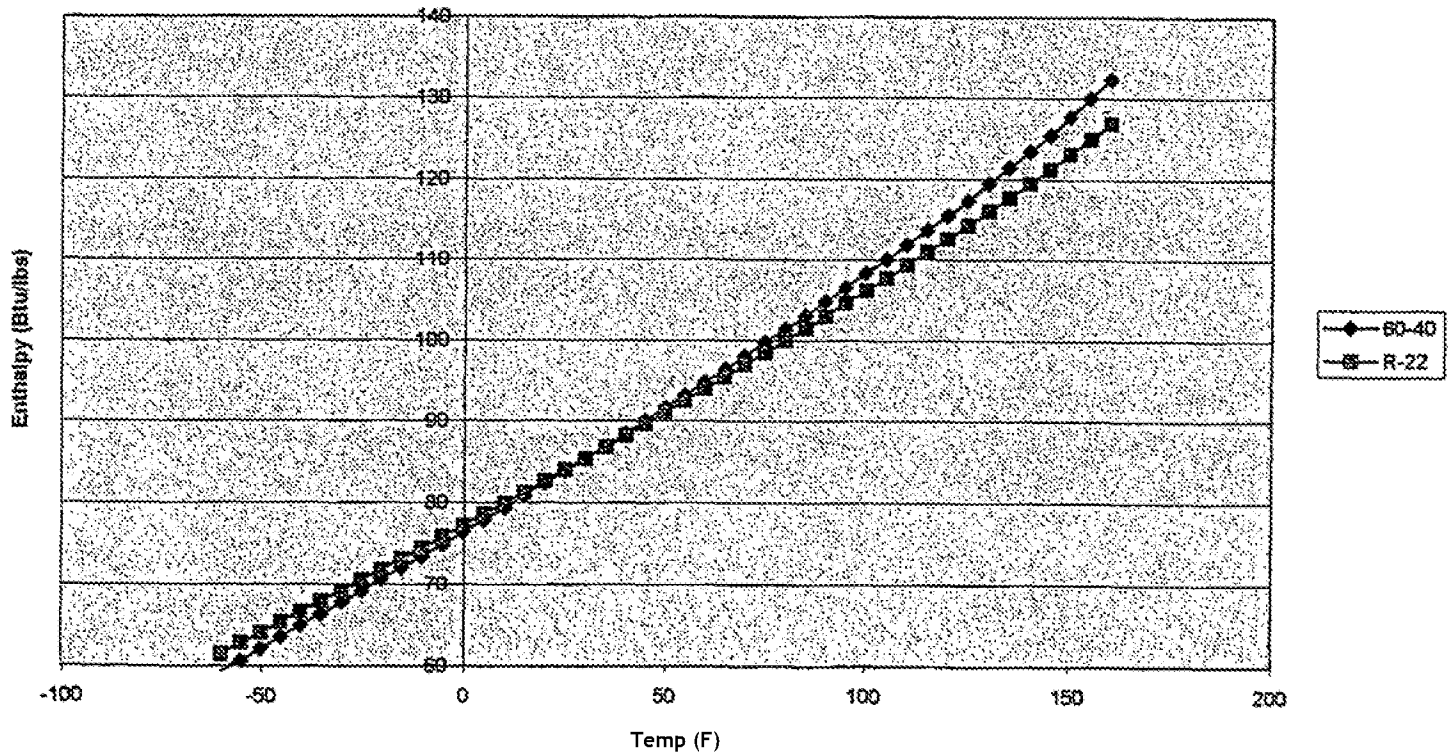


FIG. 2  
Temp vs Enthalpy



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39563247
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	28-MAY-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	14:43:54
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Argument after Notice of Appeal	821920-1033__Response_to_N otice_to_File_Corrected_Applic ation_Papers__Drawings_.pdf	139918  0bf91ff160e948088b0fc28cd593fb8f16f12 16b	no	2

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 6 of 322

<b>Information:</b>					
2	Drawings-only black and white line drawings	Replacement_1033.pdf	757069	no	1
			df347d4d21b27cb0794929472964d3a0559ea5e1		
<b>Warnings:</b>					
<b>Information:</b>					
Total Files Size (in bytes):				896987	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897
24504 7590 05/26/2020 THOMAS   HORSTEMEYER, LLP 3200 WINDY HILL ROAD, SE SUITE 1600E ATLANTA, GA 30339			EXAMINER HARDEE, JOHN R	
			ART UNIT 1761	PAPER NUMBER
			NOTIFICATION DATE 05/26/2020	DELIVERY MODE 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):

ozzie.liggins@tkhr.com  
docketing@thomashorstemeyer.com  
uspatents@tkhr.com



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
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Application No. : 15989655  
Applicant : Ponder  
Filing Date : 05/25/2018  
Date Mailed : 05/26/2020

## NOTICE TO FILE CORRECTED APPLICATION PAPERS

### *Notice of Allowance Mailed*

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

**Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.**

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

*A copy of this notice **MUST** be returned with the reply. Please address response to  
"Mail Stop Issue Fee, Commissioner for Patents,  
P.O. Box 1450, Alexandria, VA 22313-1450".*

/Chris Harmon/  
Publication Branch  
Office of Data Management  
(571) 272-4200

**IDENTIFICATION OF DRAWING DEFICIENCIES**

- ☐ There is a hole or the image thereof within the illustration. FIG(s)
- ☐ The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- ☐ An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- ☐ The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- ☐ Figure numbers are duplicated or missing. FIG(s)
- ☐ Drawing sheet or figure is missing. FIG(s)
- ☐ Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- ☒ The character of the lines, numbers, and letters is poor. FIG(s) 1,2
- ☐ The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- ☐ The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- ☐ Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s)
- ☐ The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- ☐ This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- ☐ A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- ☐ This reissue application contains added and/or amended drawings that are not labeled as "New" or "Amended" or "Canceled" as required by 37 CFR 1.173(b)(3). FIG(s)
- ☐ This Design reissue application contains a drawing that is labeled as "Canceled" but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as "Canceled." See 37 CFR 1.173(b)(3). FIG(s)
- ☐ OTHER:
- ☐ COMMENTS:



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/989,655	05/25/2018	1761	865	821920-1033	7	3

24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

**CONFIRMATION NO. 5897**  
**CORRECTED FILING RECEIPT**



Date Mailed: 05/21/2020

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.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Kenneth M. Ponder, Cumming, GA;  
Steffan Thomas, Buckhead, GA, Deceased;

**Applicant(s)**

R421A LLC, Alpharetta, GA;

**Power of Attorney:** The patent practitioners associated with Customer Number 24504

**Domestic Priority data as claimed by applicant**

This application is a CON of 13/493,491 06/11/2012 PAT 9982179  
which is a CON of 12/961,045 12/06/2010 PAT 8197706  
which is a CON of 10/937,736 09/08/2004 ABN  
which claims benefit of 60/501,049 09/08/2003

**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

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

**If Required, Foreign Filing License Granted:** 06/14/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/989,655**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

**Preliminary Class**

252

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

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

page 2 of 4



countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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

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**NOT GRANTED**


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

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technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

CPC						
Symbol					Type	Version
C09K	/	5	/	045	F	2013-01-01
C10M	/	171	/	008	I	2013-01-01
C09K	/	2205	/	22	A	2013-01-01
C09K	/	2205	/	43	A	2013-01-01
C10M	/	2203	/	1065	A	2013-01-01
C10M	/	2223	/	041	A	2013-01-01
F25B	/	2400	/	18	A	2013-01-01
C10N	/	2020	/	101	A	2020-05-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/				

NONE	<b>Total Claims Allowed:</b>	
(Assistant Examiner) _____ (Date) _____	20	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner) _____ (Date) _____	O.G. Print Claim(s) 1	O.G. Print Figure 1


<b><i>Issue Classification</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	

<b>INTERNATIONAL CLASSIFICATION</b>			
<b>CLAIMED</b>			
C09K	/	5	/ 04
<b>NON-CLAIMED</b>			
/		/	

<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>

<b>CROSS REFERENCES(S)</b>						
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>					

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner)	(Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
<b>CLAIMS</b>															
<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>
1	30	8	39	10	48	17	57								
-	31	9	40	15	49	19	58								
7	32	-	41	6	50	12	59								
-	33	-	42	13	51										
14	34	-	43	18	52										
-	35	-	44	5	53										
-	36	-	45	11	54										
2	37	-	46	16	55										
3	38	4	47	20	56										

NONE  (Assistant Examiner) _____ (Date) _____		<b>Total Claims Allowed:</b> 20	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner) _____ (Date) _____		O.G. Print Claim(s) 1	O.G. Print Figure 1

# 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)

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.

24504 7590 05/18/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

## Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897

TITLE OF INVENTION: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	08/18/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARDEE, JOHN R	1761	252-067000

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

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

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

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

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

1 Thomas|Horstemeyer, LLP

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)

R421A LLC

Alpharetta, GA

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. 20-0778

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 /Todd Deveau/

Date May 19, 2020

Typed or printed name Todd Deveau

Registration No. 29,526

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	15989655			
<b>Filing Date:</b>	25-May-2018			
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT			
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder			
<b>Filer:</b>	Todd Deveau./Sheila Gray			
<b>Attorney Docket Number:</b>	821920-1033			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>500</b>



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39476567
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	19-MAY-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:59:07
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 500
RAM confirmation Number	E20205IA59293106
Deposit Account	200778
Authorized User	Sheila Gray

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:  
37 CFR 1.21 (Miscellaneous fees and charges)

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	821920-1033__Issue_Fee.pdf	104833	no	1
			1f58673c99797b5a0fcfc06441f31ce81fb41b8		
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30318	no	2
			1fe577344dd1b054c28adea8525544989fb554b0		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			135151		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					



# UNITED STATES PATENT AND TRADEMARK OFFICE

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

## NOTICE OF ALLOWANCE AND FEE(S) DUE

24504 7590 05/18/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

EXAMINER

HARDEE, JOHN R

ART UNIT

PAPER NUMBER

1761

DATE MAILED: 05/18/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897

TITLE OF INVENTION: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	08/18/2020

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

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

### HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

# 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)

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.

24504 7590 05/18/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

## Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989.655	05/25/2018	Kenneth M. Ponder	821920-1033	5897

TITLE OF INVENTION: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

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EXAMINER	ART UNIT	CLASS-SUBCLASS
HARDEE, JOHN R	1761	252-067000

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

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

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2 \_\_\_\_\_

3 \_\_\_\_\_

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(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. \_\_\_\_\_

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☐ Applicant asserting small entity status. See 37 CFR 1.27

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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. \_\_\_\_\_



# 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897
24504	7590	05/18/2020	EXAMINER	
THOMAS   HORSTEMEYER, LLP			HARDEE, JOHN R	
3200 WINDY HILL ROAD, SE			ART UNIT	
SUITE 1600E			PAPER NUMBER	
ATLANTA, GA 30339			1761	
DATE MAILED: 05/18/2020				

## 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.

## 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 of Federal, State, or local law.

<b>Notice of Allowability</b>	<b>Application No.</b> 15/989,655	<b>Applicant(s)</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	<b>AIA (FITF) Status</b> No

**-- 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 applicant's RCE, IDS and amendments of 4/30/20.  
☐ 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 See Continuation Sheet. 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](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. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>04302020</u> . 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material _____. 4. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date. _____.	5. <input type="checkbox"/> Examiner's Amendment/Comment 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 7. <input type="checkbox"/> Other _____.
--	--

/JOHN R HARDEE/ Primary Examiner, Art Unit 1761	
--	--

Continuation of 3. The allowed claim(s) is/are: 30,32,34,37-40 and 47-59



## **DETAILED ACTION**

### ***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on April 30, 2020 has been entered.

### ***Allowable Subject Matter***

3. Claims 30, 32, 34, 37-40 and 47-59 are allowed.
4. The following is an examiner's statement of reasons for allowance: Among the references submitted in the IDS of April 30, 2020, the closest prior art is Powell et al., US 6,606,868. The reference discloses percentages of the two recited refrigerants which overlap with those presently recited, but a careful reading shows that these are only proportions of the refrigerants and a third refrigerant, a hydrocarbon, is present in all compositions motivated by the reference.

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."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, Dr. John R. Hardee, whose email address is [john.hardee@uspto.gov](mailto:john.hardee@uspto.gov). *Correspondence by email is strongly encouraged*, including for scheduling telephone interviews. Should this be impracticable, the examiner's telephone number is (571) 272-1318. The examiner can normally be reached on Monday through Friday from 8:00 until 4:30. In the event that the examiner is not available, his supervisor, Mr. Harold Pyon, may be reached at (571) 272-1498.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8100. Please note that examiners may not accept or enter faxed amendments.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


/JOHN R HARDEE/  
Primary Examiner  
Art Unit 1761

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

CPC						
Symbol					Type	Version
C09K	/	5	/	045	F	2013-01-01
C10M	/	171	/	008	I	2013-01-01
C09K	/	2205	/	22	A	2013-01-01
C09K	/	2205	/	43	A	2013-01-01
C10M	/	2203	/	1065	A	2013-01-01
C10M	/	2223	/	041	A	2013-01-01
F25B	/	2400	/	18	A	2013-01-01
C10N	/	2020	/	101	A	2020-05-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/				

NONE  (Assistant Examiner) _____ (Date) _____		<b>Total Claims Allowed:</b> 19	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner) _____ (Date) _____		12 May 2020 (Date)	O.G. Print Claim(s) 1 O.G. Print Figure 1

<b><i>Issue Classification</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761


<b>INTERNATIONAL CLASSIFICATION</b>			
<b>CLAIMED</b>			
C09K	/	5	/ 04

<b>NON-CLAIMED</b>			
/		/	

<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>


<b>CROSS REFERENCES(S)</b>						
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>					

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	19	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761	12 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
<b>CLAIMS</b>															
<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>
1	30	8	39	10	48	16	57								
-	31	9	40	14	49	18	58								
7	32	-	41	6	50	12	59								
-	33	-	42	13	51										
13	34	-	43	17	52										
-	35	-	44	5	53										
-	36	-	45	11	54										
2	37	-	46	15	55										
3	38	4	47	19	56										

NONE  (Assistant Examiner) _____ (Date) _____		<b>Total Claims Allowed:</b> 19	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner) _____ (Date) _____		12 May 2020	O.G. Print Claim(s) 1 O.G. Print Figure 1

<b><i>Search Notes</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<b>CPC - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>
C09K5/045, 2205/22	04/07/2020	JRH

<b>CPC Combination Sets - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>

<b>US Classification - Searched*</b>			
<b>Class</b>	<b>Subclass</b>	<b>Date</b>	<b>Examiner</b>

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

<b>Search Notes</b>		
<b>Search Notes</b>	<b>Date</b>	<b>Examiner</b>
EAST text and CPC searches. PE2E inventor search.	09/18/2019	JRH
C09K5/045, 2205/22	04/07/2020	JRH

<b>Interference Search</b>			
<b>US Class/CPC Symbol</b>	<b>US Subclass/CPC Group</b>	<b>Date</b>	<b>Examiner</b>
C09K	5/045; 2205/22	04/07/2020	JRH

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

## **U.S.PATENTS**

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	4983312		1992-01-08	Tamura et al.	
	2	6606868	B1	2003-08-19	Powell et al.	
	3	6863840	B2	2005-03-08	Goble	
	4	5688432	A	1997-11-18	Pearson	
	5	6271184	B1	2001-08-07	Seebauer et al.	
	6	5254280	A	1993-10-19	Thomas et al.	
	7	5384057	A	1995-01-24	Wilczek	
	8	4971712		1990-11-20	Gorski et al.	

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9	5145594	A	1992-09-08	Anton et al.
10	5942149	A	1999-08-24	Webber, III

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**U.S.PATENT APPLICATION PUBLICATIONS**

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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
1		20030062508	A1	2003-04-03	Singh et al.	

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

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**NON-PATENT LITERATURE DOCUMENTS**

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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 <sup>5</sup>
1			

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/



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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**EXAMINER SIGNATURE**

Examiner Signature	/JOHN R HARDEE/ (05/12/2020)	Date Considered	05/12/2020
--------------------	------------------------------	-----------------	------------

\*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.

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**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	/Todd Deveau/	Date (YYYY-MM-DD)	2020-04-30
Name/Print	Todd Deveau	Registration Number	29526

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

## Privacy Act Statement

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

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

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

## EAST Search History

### EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	3	(US-20030062508-\$   US-5145594-\$   US-5942149-\$).DID.	US-PGPUB; USPAT	OR	ON	2020/05/12 09:35
L8	8	(US-4971712-\$   US-4983312-\$   US-5254280-\$   US-6271184-\$   US-5384057-\$   US-6606868-\$   US-5688432-\$   US-6863840-\$).DID.	US-PGPUB; USPAT	OR	ON	2020/05/12 09:40
L9	11	3 8	US-PGPUB; USPAT	OR	ON	2020/05/12 09:41
L10	1	(US-6606868-\$).did.	USPAT	OR	ON	2020/05/12 09:47
S2	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:11
S4	4678	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S5	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S6	4685	S4 S5	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S7	2057	"1,1,2,2-tetrafluoroethane"	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S8	4733	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22

S9	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S10	5584	S8 S9 S7	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S11	7912	(r hfc) adj "125" r125 hfc125 pentafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S12	2057	"1,1,2,2-tetrafluoroethane"	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S13	4733	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S14	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S15	5584	S13 S14 S12	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S16	1132	S11 near4 S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S17	914	S11 near2 S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25
S18	617	S11 near S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25
S19	276	S18 AND ( (C09K5/045 OR C09K2205/22).CPC. )	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25
S20	2	((("9982179") or ("8197706"))).PN.	US-PGPUB; USPAT	OR	OFF	2019/09/18 16:04

**5/12/2020 10:26:16 AM**

**C:\Users\jhardee\Documents\EAST\Workspaces\989655.wsp**

# **REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL** **(Submitted Only via EFS-Web)**

Application Number	15/989,655	Filing Date	2018-05-25	Docket Number (if applicable)	821920-1033	Art Unit	1761
First Named Inventor	Kenneth M. Ponder			Examiner Name	Hardee, John R.		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

## **SUBMISSION REQUIRED UNDER 37 CFR 1.114**

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

☐ Other \_\_\_\_\_

☒ Enclosed

☒ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other \_\_\_\_\_

## **MISCELLANEOUS**

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
 (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other \_\_\_\_\_

## **FEES**

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**  
 The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to  
 Deposit Account No 200778

## **SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

☒ Patent Practitioner Signature  
 Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	Todd Deveau/	Date (YYYY-MM-DD)	2020-04-30
Name	Todd Deveau	Registration Number	29526

This collection of information is required by 37 CFR 1.114. 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 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.

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



## 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).
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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		15989655
	Filing Date		2018-05-25
	First Named Inventor	Kenneth M. Ponder	
	Art Unit	1761	
	Examiner Name	Hardee, John R.	
	Attorney Docket Number	821920-1033	

U.S.PATENTS						<a href="#">Remove</a>
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	4983312		1992-01-08	Tamura et al.	
	2	6606868	B1	2003-08-19	Powell et al.	
	3	6863840	B2	2005-03-08	Goble	
	4	5688432	A	1997-11-18	Pearson	
	5	6271184	B1	2001-08-07	Seebauer et al.	
	6	5254280	A	1993-10-19	Thomas et al.	
	7	5384057	A	1995-01-24	Wilczek	
	8	4971712		1990-11-20	Gorski et al.	

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STATEMENT BY APPLICANT**  
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Application Number	15989655
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Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

9	5145594	A	1992-09-08	Anton et al.	
10	5942149	A	1999-08-24	Webber, III	

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**EXAMINER SIGNATURE**

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*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.

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

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**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	/Todd Deveau/	Date (YYYY-MM-DD)	2020-04-30
Name/Print	Todd Deveau	Registration Number	29526

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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## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	15989655			
<b>Filing Date:</b>	25-May-2018			
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT			
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder			
<b>Filer:</b>	Todd Deveau./Sheila Gray			
<b>Attorney Docket Number:</b>	821920-1033			
Filed as Small Entity				
<b>Filing Fees for    Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
RCE- 1ST REQUEST	2801	1	650	650
<b>Total in USD (\$)</b>				<b>650</b>



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39303059
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	30-APR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	07:10:01
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	821920-1033__RCE__submit_art_.pdf	1350138	no	3
			8387bdf43685dd6852284b4356008f4046c2b120		
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	821920-1033__IDS__submit_w-RCE_.pdf	1034985	no	5
			24d2d1c864a15f2f15a5f8d9ec9ae9236113f6b2		
Warnings:					
Information:					
3	Amendment Submitted/Entered with Filing of CPA/RCE	821920-1033__Response_to_FOA_and_Submission_of_IDS_.pdf	194237	no	9
			6fe59638f8e679dd953c5c0781d5e10b07f32c3d		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30458	no	2
			486e8bf3632cf86e4341491a5020f392133a370b		
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**New Applications Under 35 U.S.C. 111**

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

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**New International Application Filed with the USPTO as a Receiving Office**

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

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

Kenneth M. Ponder

Group Art Unit: 1761

Serial No.: 15/989,655

Examiner: Hardee, John R.

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

**RESPONSE TO FINAL OFFICE ACTION, AND SUBMISSION OF IDS, ALONG WITH  
REQUEST FOR CONTINUED EXAMINATION**

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

Sir:

The Final Office Action from Examiner John R. Hardee mailed on March 9, 2020 (Paper No./Mail Date 20200303), has been received and reviewed. Applicants provide the following remarks in response.

**AUTHORIZATION TO DEBIT ACCOUNT**

It is not believed that extensions of time or fees for net addition of claims are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that an extension of time is necessary to allow consideration of this paper, such extension is hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefore (including fees for net addition of claims) are hereby authorized to be charged to deposit account no. 20-0778.

## **AMENDMENTS TO THE CLAIMS**

Please amend the claims as indicated hereafter wherein the changes are shown by strikethrough or double brackets for deleted matter and underlining for added matter.

1-29. (Cancelled)

30. (Previously Presented) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition designed to achieve a phase change, the refrigerant composition comprising a combination of refrigerant gases, said refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

31. (Cancelled)

32. (Currently Amended) A method for refilling an apparatus designed for use with a chlorodifluoromethane refrigerant, the method comprising:

(1) selecting a substitute refrigerant composition designed to achieve a phase change and comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight ~~of the combined weight of the pentafluoroethane and tetrafluoroethane~~ on the basis of the combined weights of said

pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the tetrafluoroethane is 1,1,1,2- tetrafluoroethane, and

(2) supplying the substitute refrigerant composition under pressure, in a cylinder can fitted with an outlet compatible with a chlorodifluoromethane recharging manifold of the apparatus.

33. (Cancelled)

34. (Previously Presented) A refrigerant composition comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the refrigerant composition said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight on the basis of the combined weights of said pentafluoroethane, and said tetrafluoroethane totaling 100% and wherein said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

35-36. (Cancelled)

37. (Previously Presented) In the apparatus of claim 30, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

38. (Previously Presented) In the apparatus of claim 30, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

39. (Previously Presented) The method according to claim 32, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

40. (Previously Presented) The method according to claim 32, wherein the substitute refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

41-46. (Cancelled)

47. (New) In the apparatus of claim 30, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

48. (New) The method according to claim 32, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

49. (New) The refrigerant composition according to claim 34, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

50. (New) In the apparatus of claim 30, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

51. (New) The method according to claim 32, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

52. (New) The refrigerant composition according to claim 34, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

53. (New) In the apparatus of claim 47, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

54. (New) The method according to claim 48, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

55. (New) The refrigerant composition according to claim 49, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

56. (New) The refrigerant composition according to claim 34, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

57. (New) The refrigerant composition according to claim 49, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.



58. (New) The refrigerant composition according to claim 52, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

59. (New) The refrigerant composition according to claim 54, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

## **REMARKS**

The Applicants thank the Examiner for the issuance of the Final Office Action that presents a single issue, namely: a rejection on the ground of statutory double patenting in view of certain claims identified in US 8,197,706 and in US 9,982,179.

In response, Applicants previously submitted on April 2, 2020, a Terminal Disclaimer to both US 8,197,706 and in US 9,982,179, which Terminal Disclaimer has been approved, thereby traversing the rejection.

Applicants have amended claim 32 to correct a redundancy in the claim and added new claims 47 to 59. New claims 47-49 find support, for example, at least at: page 7, lines 10-12; page 14, lines 4-8; and Fig. 1. New claims 50-55 find support, for example, at least at: page 7, lines 13-18, and page 9, lines 16-19. New claims 56-59 find support, for example, at page 10, lines 14-18 and page 14, lines 14-18.

Further, Applicants also submit herewith an Information Disclosure Statement. Applicants have been provided the references listed in the Information Disclosure Statement by a third party in conjunction with a dispute involving US Patent 9,982,179, issued May 29, 2018 from parent application serial number 13/493,491, on which priority is claimed herein, and the potential that the third party may request review of the '179 patent. The third party has also presented some arguments labeled as "Draft". Considering that the arguments are labeled "Draft," and constitute basically attorney argument, the "Draft" arguments are not presented herewith on the belief that the Examiner, who has examined the entire history of the various applications noted below, including SN 10/937,736, filed on September 8, 2004, is in better position to make his own determination of these references.

The references listed in the IDS have been presented by the third party in addition to US 6,207,071 (Takigawa et al.; “*Takigawa*”) that is already cited in the present application history and was also cited in application 13/493,491.

Applicants note that references 1, 2 (by way of foreign equivalent WO 01/23493 – Powell et al.; “*Powell*”), and 6-10 were previously cited and considered in connection with parent application serial number 10/937,736 (wherein the present application is a continuation of SN 13/493,491, now US 9,982,179, that is a continuation of SN 12/961,045, now US 8,197,706, that is a continuation of SN 10/937,736, filed on September 8, 2004, that claims the benefit of provisional application SN 60/501,049).

References 3-4 do not appear to be any more relevant than *Powell*, in that they are directed to compositions having at least three refrigerant gasses.

Reference 5 (Seebaurer et al.) is titled “Viscosity Improvers for Lubricating Oil Compositions.”

The reference 1 under US Patent Application Publications, US 2003/0062508, is equivalent to EP 1 295 928 – “*Honeywell*”), was also cited and considered in connection with SN 10/937,736 and is directed to a refrigerant composition having at least three refrigerant gasses, like *Powell* and references 3-4.

## **CONCLUSION**

In light of the foregoing remarks and for at least the reasons set forth above, Applicants respectfully submit that the remaining rejection has been traversed and that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,

**THOMAS | HORSTEMEYER, LLP**

By: /Todd Deveau/

**Todd Deveau**

**Registration No. 29,526**

**THOMAS | HORSTEMEYER, L.L.P.**  
**Customer Number 24504**

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.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number 15/989,655		Filing Date 05/25/2018		<input type="checkbox"/> To be Mailed	
ENTITY: <input type="checkbox"/> LARGE <input checked="" type="checkbox"/> SMALL <input type="checkbox"/> MICRO									
<b>APPLICATION AS FILED - PART I</b>									
		(Column 1)	(Column 2)						
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)		
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A		N/A				
<input type="checkbox"/> 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 =					
<input type="checkbox"/> 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).							
<input type="checkbox"/> 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				
<b>APPLICATION AS AMENDED - PART II</b>									
		(Column 1)		(Column 2)	(Column 3)				
<b>AMENDMENT</b>	04/30/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$50 =		0	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$230 =		0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		0	
		(Column 1)		(Column 2)	(Column 3)				
<b>AMENDMENT</b>		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 =			
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> 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.						SLIE			
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/ALA H HUNTER/			
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
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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	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
--------------------	---

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 15/989,655 filed on May 25, 2018

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: Kenneth M. Ponder Date (Optional): \_\_\_\_\_

Signature: *Kenneth M. Ponder*

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

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.

**SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY  
OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)**

<b>Title of Invention</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		
This statement is directed to:			
<input type="checkbox"/> The attached application,			
OR			
<input checked="" type="checkbox"/> United States application or PCT international application number <u>15/989,655</u> filed on <u>May 25, 2018</u> .			
<b>LEGAL NAME of inventor to whom this substitute statement applies:</b>			
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)			
Steffan Thomas			
Residence (except for a deceased or legally incapacitated inventor):			
City	State	Country	
Mailing Address (except for a deceased or legally incapacitated inventor):			
City	State	Zip	Country
I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.			
The above-identified application was made or authorized to be made by me.			
I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
Relationship to the inventor to whom this substitute statement applies:			
<input type="checkbox"/> Legal Representative (for deceased or legally incapacitated inventor only),			
<input checked="" type="checkbox"/> Assignee,			
<input type="checkbox"/> Person to whom the inventor is under an obligation to assign,			
<input type="checkbox"/> Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or			
<input type="checkbox"/> Joint Inventor.			

[Page 1 of 2]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.*

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.

**SUBSTITUTE STATEMENT**

Circumstances permitting execution of this substitute statement:

- ☒ Inventor is deceased,
- ☐ Inventor is under legal incapacity,
- ☐ Inventor cannot be found or reached after diligent effort, or
- ☐ Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- ☒ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.
- OR
- ☐ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

**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.

**PERSON EXECUTING THIS SUBSTITUTE STATEMENT:**

Name: **Kenneth M. Ponder** Date (Optional):

Signature: *Kenneth M. Ponder*

**APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:**

If the applicant is a juristic entity, list the applicant name and the title of the signer:

**R421A LLC**

Applicant Name:

Title of Person Executing This Substitute Statement: **Manager**

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City: State: Country:

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

**610 McFarland 400 Dr.**

City: **Alpharetta** State: **GA** Zip: **30004** Country: **US**

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39296451
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	29-APR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:44:42
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	821920-1033__Declaration_-_signed.pdf	463823  a7ffdf678d73266f30e99c54519b7ee253e11744	no	1

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 69 of 322

<b>Information:</b>					
2	Oath or Declaration filed	821920-1033__Substitute_Oath_or_Declaration_-_Thomas_-_signed.pdf	647991	no	2
			20e52d6dad4bc0ad111b7230dfb81083ea4e9737		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1111814		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>					



# UNITED STATES PATENT AND TRADEMARK OFFICE

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

## NOTICE OF ALLOWANCE AND FEE(S) DUE

24504 7590 04/13/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

EXAMINER

HARDEE, JOHN R

ART UNIT

PAPER NUMBER

1761

DATE MAILED: 04/13/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897

TITLE OF INVENTION: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	07/13/2020

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

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

### HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

# 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)

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.

24504 7590 04/13/2020  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

## Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897

TITLE OF INVENTION: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	07/13/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARDEE, JOHN R	1761	252-067000

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

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

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

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 \_\_\_\_\_

(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.

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. \_\_\_\_\_



# UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897
24504	7590	04/13/2020	EXAMINER	
THOMAS   HORSTEMEYER, LLP			HARDEE, JOHN R	
3200 WINDY HILL ROAD, SE			ART UNIT	
SUITE 1600E			PAPER NUMBER	
ATLANTA, GA 30339			1761	

DATE MAILED: 04/13/2020

## 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.

<b><i>Notice Requiring Inventor's Oath or Declaration</i></b>	Application No. 15/989,655	Applicant(s) Kenneth M. Ponder	
	Examiner HARDEE, JOHN R	Art Unit 1761	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) **MUST** be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

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

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

#### INFORMAL ACTION PROBLEMS

- A properly executed inventor's oath or declaration has not been received for the following inventor(s): **Kenneth M. Ponder** and **Steffan Thomas**.

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

## 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 of Federal, State, or local law.

<b>Notice of Allowability</b>	<b>Application No.</b> 15/989,655	<b>Applicant(s)</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	<b>AIA (FITF) Status</b> No

**-- 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 applicant's terminal disclaimer.  
☐ 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 30,32,34 and 37-40. 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](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto: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. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____ 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material _____ 4. <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date. _____	5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 7. <input checked="" type="checkbox"/> Other <u>PTO-303</u> .
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/JOHN R HARDEE/  
Primary Examiner, Art Unit 1761



## **DETAILED ACTION**

### ***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

### **EXAMINER'S AMENDMENT**

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Mr. Todd Deveau on April 7, 2020.

The application has been amended as follows:

At line 1 of the specification [, mineral oil, synthetic alkyl aromatic lubricants and mixtures thereof] was deleted.

At line 2 of the specification, before "which", ---issued as U. S. Patent 9,982,179,-- was inserted.

### ***Allowable Subject Matter***

3. Claims 30, 32, 34 and 37-40 are allowed.
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, Dr. John R. Hardee, whose email address

is [john.hardee@uspto.gov](mailto:john.hardee@uspto.gov). *Correspondence by email is strongly encouraged*, including for scheduling telephone interviews. Should this be impracticable, the examiner's telephone number is (571) 272-1318. The examiner can normally be reached on Monday through Friday from 8:00 until 4:30. In the event that the examiner is not available, his supervisor, Mr. Harold Pyon, may be reached at (571) 272-1498.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8100. Please note that examiners may not accept or enter faxed amendments.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/JOHN R HARDEE/  
Primary Examiner  
Art Unit 1761

<b><i>Examiner-Initiated Interview Summary</i></b>	<b>Application No.</b> 15/989,655	<b>Applicant(s)</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	<b>AIA (FITF) Status</b> No

All participants (applicant, applicant's representative, PTO personnel):

(1) JOHN R. HARDEE. (3) \_\_\_\_.

(2) Mr. Todd Deveau. (4) \_\_\_\_.

Date of Interview: 06 April 2020.

Type: ☒ Telephonic    ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes    ☐ No.  
If Yes, brief description: \_\_\_\_.

Issues Discussed    ☐ 101    ☐ 112    ☐ 102    ☐ 103    ☒ Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: \_\_\_\_.

Identification of prior art discussed: \_\_\_\_.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant's after-final amendment adds claims without cancelling an equal number of pending claims. Entry is denied. However, applicant's terminal disclaimer overcomes the only rejection of record, so the pending claims will be allowed. Applicant has indicated interest in filing an RCE or a continuation application to have the claims which were submitted with the after final entered, considered and examined..

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/JOHN R HARDEE/ Primary Examiner, Art Unit 1761	
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<b>Advisory Action</b> <b>Before the Filing of an Appeal Brief</b>	<b>Application No.</b> 15/989,655	<b>Applicant(s)</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	<b>AIA (FITF) Status</b> No

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

THE REPLY FILED 02 April 2020 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): Double patenting

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: \_\_\_\_\_.

**STATUS OF CLAIMS**

15. The status of the claim(s) is (or will be) as follows:  
 Claim(s) allowed: 30,32,34 and 37-40.  
 Claim(s) objected to: \_\_\_\_\_.  
 Claim(s) rejected: \_\_\_\_\_.  
 Claim(s) withdrawn from consideration: \_\_\_\_\_.

/JOHN R HARDEE/ Primary Examiner, Art Unit 1761	
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<b><i>Search Notes</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<b>CPC - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>
C09K5/045, 2205/22	04/07/2020	JRH

<b>CPC Combination Sets - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>


<b>US Classification - Searched*</b>			
<b>Class</b>	<b>Subclass</b>	<b>Date</b>	<b>Examiner</b>

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

<b>Search Notes</b>		
<b>Search Notes</b>	<b>Date</b>	<b>Examiner</b>
EAST text and CPC searches. PE2E inventor search.	09/18/2019	JRH
C09K5/045, 2205/22	04/07/2020	JRH

<b>Interference Search</b>			
<b>US Class/CPC Symbol</b>	<b>US Subclass/CPC Group</b>	<b>Date</b>	<b>Examiner</b>
C09K	5/045; 2205/22	04/07/2020	JRH


--	--

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.	
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761	

CPC						
Symbol					Type	Version
C09K	/	5	/	045	F	2013-01-01
C10M	/	171	/	008	I	2013-01-01
C09K	/	2205	/	22	A	2013-01-01
C09K	/	2205	/	43	A	2013-01-01
C10M	/	2203	/	1065	A	2013-01-01
C10M	/	2223	/	041	A	2013-01-01
C10N	/	2220	/	302	A	2013-01-01
F25B	/	2400	/	18	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/				

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	6	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner)	07 April 2020 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761


<b>INTERNATIONAL CLASSIFICATION</b>			
<b>CLAIMED</b>			
C09K	/	5	/ 04

<b>NON-CLAIMED</b>			
/	/		

<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>

<b>CROSS REFERENCES(S)</b>						
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>					

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	6	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner)	07 April 2020 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

<b><i>Issue Classification</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
<b>CLAIMS</b>															
<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>	<b>Final</b>	<b>Original</b>
1	30	5	39												
-	31	6	40												
4	32														
-	33														
7	34														
-	35														
-	36														
2	37														
3	38														

NONE  (Assistant Examiner) _____ (Date) _____		<b>Total Claims Allowed:</b> 6	
/JOHN R HARDEE/ Primary Examiner, Art Unit 1761 (Primary Examiner) _____ (Date) _____		07 April 2020 (Date)	O.G. Print Claim(s) 1 O.G. Print Figure 1



## Bibliographic Data

Application No: 15/989,655

Foreign Priority claimed: ☐ Yes ☒ No

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

Verified and Acknowledged: /JOHN R HARDEE/

Examiner's Signature

Initials

Title:

REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT  
OF R22 REFRIGERANT

---

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/25/2018	252	1761	821920-1033
<b>RULE</b>			

### APPLICANTS

R421A LLC, Alpharetta, GA,

### INVENTORS

Kenneth M. Ponder Cumming, GA, UNITED STATES

Steffan Thomas Buckhead, GA, UNITED STATES

### CONTINUING DATA

This application is a CON of 13493491 06/11/2012 PAT 9982179

13493491 is a CON of 12961045 12/06/2010 PAT 8197706

12961045 is a CON of 10937736 09/08/2004ABN

10937736 has PRO of 60501049 09/08/2003

### FOREIGN APPLICATIONS

#### IF REQUIRED, FOREIGN LICENSE GRANTED\*\*

06/14/2018

**\*\* SMALL ENTITY \*\***

### STATE OR COUNTRY

UNITED STATES

### ADDRESS

THOMAS | HORSTEMEYER, LLP

3200 WINDY HILL ROAD, SE

SUITE 1600E

ATLANTA, GA 30339

UNITED STATES

### FILING FEE RECEIVED

\$865

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

Kenneth M. Ponder

Group Art Unit: 1761

Serial No.: 15/989,655

Examiner: Hardee, John R.

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

**RESPONSE TO FINAL OFFICE ACTION**

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

Sir:

The Final Office Action from Examiner John R. Hardee mailed on March 9, 2020 (Paper No./Mail Date 20200303), has been received and reviewed. Applicants provide the following remarks in response.

**AUTHORIZATION TO DEBIT ACCOUNT**

It is not believed that extensions of time or fees for net addition of claims are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that an extension of time is necessary to allow consideration of this paper, such extension is hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefore (including fees for net addition of claims) are hereby authorized to be charged to deposit account no. 20-0778.

<b>Doc Code: DIST.E.FILE</b> <b>Document Description: Electronic Terminal Disclaimer - Filed</b>		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	<b>TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT</b>	
Application Number	15989655	
Filing Date	25-May-2018	
First Named Inventor	Kenneth Ponder	
Attorney Docket Number	821920-1033	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT	
<input checked="" type="checkbox"/> Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action  <input checked="" type="checkbox"/> This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.		
Owner	Percent Interest	
R421A LLC	100%	
<p>The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)</p> <p>9982179 8197706</p> <p>as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.</p> <p>In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:</p> <ul style="list-style-type: none"> <li>- expires for failure to pay a maintenance fee;</li> <li>- is held unenforceable;</li> <li>- is found invalid by a court of competent jurisdiction;</li> <li>- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;</li> <li>- has all claims canceled by a reexamination certificate;</li> <li>- is reissued; or</li> <li>- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.</li> </ul>		

☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

☐ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

☒ Small Entity

☐ Micro Entity

☐ Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

☒ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 29526

☐ A sole inventor

☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

☐ A joint inventor; all of whom are signing this request

Signature	/Todd Deveau/
Name	Todd Deveau

\*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).  
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	15989655			
<b>Filing Date:</b>	25-May-2018			
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT			
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder			
<b>Filer:</b>	Todd Deveau./Sheila Gray			
<b>Attorney Docket Number:</b>	821920-1033			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	160	160
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				160

Doc Code: DISQ.E.FILE

Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 15989655

Filing Date: 25-May-2018

Applicant/Patent under Reexamination: Ponder

Electronic Terminal Disclaimer filed on April 2, 2020

☒ APPROVED

**This patent is subject to a terminal disclaimer**

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39041366
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	02-APR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:32:46
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 160
RAM confirmation Number	E202042A32408311
Deposit Account	200778
Authorized User	Sheila Gray

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:  
37 CFR 1.21 (Miscellaneous fees and charges)



<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33573	no	2
			d14e23afd2b66e35cd14e7c8a0c96181f32b1153		
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30500	no	2
			c29882c08269f9c441fe9f1292a933df0f07b67d		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			64073		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					

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.

**STATEMENT UNDER 37 CFR 3.73(c)**Applicant/Patent Owner: Kenneth M. PonderApplication No./Patent No.: 15/989,655 Filed/Issue Date: May 25, 2018Titled: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANTR421A LLC, a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is \_\_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: ESTATE OF STEFFEN W. THOMAS, JR. & KENNETH M. PONDER To: STEFKO PROPERTIES, LLCThe document was recorded in the United States Patent and Trademark Office at  
Reel 052121, Frame 0739, or for which a copy thereof is attached.2. From: STEFKO PROPERTIES, LLC To: R421A LLCThe document was recorded in the United States Patent and Trademark Office at  
Reel 052121, Frame 0803, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). 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 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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Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 94 of 322

**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: ESTATE OF STEFFEN W. THOMAS, JR. & KENNETH M. PONDER To: STEFKO PROPERTIES, LLC

The document was recorded in the United States Patent and Trademark Office at  
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4. From: STEFKO PROPERTIES, LLC To: R421A LLC

The document was recorded in the United States Patent and Trademark Office at  
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5. From: ESTATE OF STEFFEN W. THOMAS, JR. & KENNETH M. PONDER To: STEFKO PROPERTIES, LLC

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6. From: STEFKO PROPERTIES, LLC To: R421A LLC

The document was recorded in the United States Patent and Trademark Office at  
Reel 052121, Frame 0803, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Todd Deveau/

Signature

Todd Deveau

Printed or Typed Name

April 2, 2020

Date

29,526

Title or Registration 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.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39041509
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	02-APR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:42:46
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response After Final Action	821920-1033__Response_to_Final_Office_Action_mailed_3-9-20.pdf	133698 465b91b77afac1763d29b6ebda6f57d64f7b393a	no	8

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 97 of 322

<b>Information:</b>					
2	Assignee showing of ownership per 37 CFR 3.73	821920-1033__AIA_96_Statement_Under_37CFR_3_73_c__file_with_Response_.pdf	125443	no	3
			e92027e7293a27cfe1032e34c8db04aafc30a301		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			259141		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>					

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

Kenneth M. Ponder

Group Art Unit: 1761

Serial No.: 15/989,655

Examiner: Hardee, John R.

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

**RESPONSE TO FINAL OFFICE ACTION**

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

Sir:

The Final Office Action from Examiner John R. Hardee mailed on March 9, 2020 (Paper No./Mail Date 20200303), has been received and reviewed. Applicants provide the following remarks in response.

**AUTHORIZATION TO DEBIT ACCOUNT**

It is not believed that extensions of time or fees for net addition of claims are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that an extension of time is necessary to allow consideration of this paper, such extension is hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefore (including fees for net addition of claims) are hereby authorized to be charged to deposit account no. 20-0778.

## **AMENDMENTS TO THE CLAIMS**

Please amend the claims as indicated hereafter wherein the changes are shown by strikethrough or double brackets for deleted matter and underlining for added matter.

1-29. (Cancelled)

30. (Previously Presented) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition designed to achieve a phase change, the refrigerant composition comprising a combination of refrigerant gases, said refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

31. (Cancelled)

32. (Currently Amended) A method for refilling an apparatus designed for use with a chlorodifluoromethane refrigerant, the method comprising:

(1) selecting a substitute refrigerant composition designed to achieve a phase change and comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight



~~of the pentafluoroethane and tetrafluoroethane~~ on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the tetrafluoroethane is 1,1,1,2- tetrafluoroethane, and

(2) supplying the substitute refrigerant composition under pressure, in a cylinder can fitted with an outlet compatible with a chlorodifluoromethane recharging manifold of the apparatus.

33. (Cancelled)

34. (Previously Presented) A refrigerant composition comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the refrigerant composition said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight on the basis of the combined weights of said pentafluoroethane, and said tetrafluoroethane totaling 100% and wherein said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

35-36. (Cancelled)

37. (Previously Presented) In the apparatus of claim 30, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

38. (Previously Presented) In the apparatus of claim 30, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

39. (Previously Presented) The method according to claim 32, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

40. (Previously Presented) The method according to claim 32, wherein the substitute refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

41-46. (Cancelled)

47. (New) In the apparatus of claim 30, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

48. (New) The method according to claim 32, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

49. (New) The refrigerant composition according to claim 34, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

50. (New) In the apparatus of claim 30, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

51. (New) The method according to claim 32, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

52. (New) The refrigerant composition according to claim 34, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

53. (New) In the apparatus of claim 47, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

54. (New) The method according to claim 48, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

55. (New) The refrigerant composition according to claim 49, wherein the refrigerant composition further comprises a non-refrigerant gas component in the form of a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane.

56. (New) The refrigerant composition according to claim 34, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

57. (New) The refrigerant composition according to claim 49, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

58. (New) The refrigerant composition according to claim 52, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

59. (New) The refrigerant composition according to claim 54, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

## **REMARKS**

The Office Action presents a single issue, namely: on the ground of statutory double patenting in view of certain claims identified in US 8,197,706 and in US 9,982,179.

In response, Applicants submit herewith a Terminal Disclaimer to both US 8,197,706 and in US 9,982,179, thereby traversing the rejection. Also submitted herewith is a Statement Under 37 CFR 3.73 (c) showing that both cited patents as well as the present application are all commonly owned by the same assignee.

Additionally, Applicants have amended claim 32 to correct a redundancy in the claim and added new claims 47 to 59. New claims 47-49 find support, for example, at least at: page 7, lines 10-12; page 14, lines 4-8; and Fig. 1. New claims 50-55 find support, for example, at least at: page 7, lines 13-18, and page 9, lines 16-19. New claims 56-59 find support, for example, at page 10, lines 14-18 and page 14, lines 14-18.

## **CONCLUSION**

In light of the foregoing remarks and for at least the reasons set forth above, Applicants respectfully submit that the remaining rejection has been traversed and that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,

**THOMAS | HORSTEMEYER, LLP**

By: /Todd Deveau/

**Todd Deveau**

**Registration No. 29,526**

**THOMAS | HORSTEMEYER, L.L.P.**  
**Customer Number 24504**

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number 15/989,655		Filing Date 05/25/2018		<input type="checkbox"/> To be Mailed	
ENTITY: <input type="checkbox"/> LARGE <input checked="" type="checkbox"/> SMALL <input type="checkbox"/> MICRO									
<b>APPLICATION AS FILED - PART I</b>									
		(Column 1)	(Column 2)						
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)		
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A		N/A				
<input type="checkbox"/> 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 =					
<input type="checkbox"/> 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).							
<input type="checkbox"/> 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				
<b>APPLICATION AS AMENDED - PART II</b>									
		(Column 1)		(Column 2)	(Column 3)				
<b>AMENDMENT</b>	04/02/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$50 =		0	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$230 =		0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		0	
		(Column 1)		(Column 2)	(Column 3)				
<b>AMENDMENT</b>		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 =			
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> 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.						SLIE			
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/DEBORAH R PORTER/			
*** 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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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033

24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

**CONFIRMATION NO. 5897**  
**POA ACCEPTANCE LETTER**



Date Mailed: 04/01/2020

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 03/27/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

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

/atesfai/





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Alexandria, Virginia 22313-1450  
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/989,655	05/25/2018	1761	865	821920-1033	7	3

24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

**CONFIRMATION NO. 5897**  
**REPLACEMENT FILING RECEIPT**



Date Mailed: 04/01/2020

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.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Kenneth M. Ponder, Cumming, GA;  
Steffan Thomas, Buckhead, GA;

**Applicant(s)**

R421A LLC, Alpharetta, GA;

**Power of Attorney:** The patent practitioners associated with Customer Number 24504

**Domestic Priority data as claimed by applicant**

This application is a CON of 13/493,491 06/11/2012 PAT 9982179  
which is a CON of 12/961,045 12/06/2010 PAT 8197706  
which is a CON of 10/937,736 09/08/2004 ABN  
which claims benefit of 60/501,049 09/08/2003

**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

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

**If Required, Foreign Filing License Granted:** 06/14/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/989,655**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

**Preliminary Class**

252

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

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

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countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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

**GRANTED**

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

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

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

**NOT GRANTED**

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

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

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
15/989,655	May 25, 2018

(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: 24504
- 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

<input type="checkbox"/> 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):

R421A LLC

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

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

Signature		Date (Optional)	
Name	Kenneth M. Ponder		
Title	R421A LLC (Manager)		

**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 \_\_\_\_\_ 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-PTC-9199 and select option 2.

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.

**STATEMENT UNDER 37 CFR 3.73(c)**Applicant/Patent Owner: Kenneth M. PonderApplication No./Patent No.: 15/989,655 Filed/Issue Date: May 25, 2018Titled: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANTR421A LLC, a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is \_\_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: ESTATE OF STEFFEN W. THOMAS, JR. & KENNETH M. PONDER To: STEFKO PROPERTIES, LLCThe document was recorded in the United States Patent and Trademark Office at  
Reel 052121, Frame 0739, or for which a copy thereof is attached.2. From: STEFKO PROPERTIES, LLC To: R421A LLCThe document was recorded in the United States Patent and Trademark Office at  
Reel 052121, Frame 0803, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). 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 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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R421A Exhibit 2003 Page 114 of 322

**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

4. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

5. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

6. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Todd Deveau/

Signature

Todd Deveau

Printed or Typed Name

March 27, 2020

Date

29,526

Title or Registration 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.



Doc Code: R46C.REQ

Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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**REQUEST TO CORRECT OR UPDATE  
THE NAME OF THE APPLICANT UNDER  
37 CFR 1.46(c)(1), OR CHANGE THE  
APPLICANT UNDER 37 CFR 1.46(c)(2)  
(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER  
SEPTEMBER 16, 2012)**

Application Number	15/989,655
Filing Date	May 25, 2018
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Practitioner Docket Number	821920-1033

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

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant (under 37 CFR 1.46(c)(1))** and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (e.g., underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

**Note:** Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (i.e., where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

☒ 2. This request is to **change the applicant (under 37 CFR 1.46(c)(2))** and includes:

☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

☒ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant\*

☒ attorney or agent of record

Registration number 29,526

☐ attorney or agent acting under 37 CFR 1.34

Registration number \_\_\_\_\_

Signature /Todd Deveau/

Typed or printed name Todd Deveau

Date March 27, 2020

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. \*Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below\*\*.

☐ \*\* Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.36. 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 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.*

## 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.




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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		
<p>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.</p> <p>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.</p>			

## Secrecy Order 37 CFR 5.2:

<input type="checkbox"/> 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:

<b>Inventor 1</b>						
<b>Legal Name</b>						
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>		
	Kenneth	M.	Ponder			
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
<b>City</b>	Cumming	<b>State/Province</b>	GA	<b>Country of Residence</b>	US	
<b>Mailing Address of Inventor:</b>						
<b>Address 1</b>		105 Highland View Drive				
<b>Address 2</b>						
<b>City</b>	Cumming	<b>State/Province</b>	GA			
<b>Postal Code</b>	30040	<b>Country</b>	US			
<b>Inventor 2</b>						
<b>Legal Name</b>						
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>		
	Steffan		Thomas			
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
<b>City</b>	Buckhead	<b>State/Province</b>	GA	<b>Country of Residence</b>	US	
<b>Mailing Address of Inventor:</b>						
<b>Address 1</b>		4250 Bethany Road				
<b>Address 2</b>						
<b>City</b>	Buckhead	<b>State/Province</b>	GA			
<b>Postal Code</b>	30625	<b>Country</b>	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the <b>Add</b> button.						

## Correspondence Information:

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

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

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

Customer Number	24504		
Email Address		<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

### Application Information:

Title of the Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		
Attorney Docket Number	821920-1033	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	1	Suggested Figure for Publication (if any)	

### 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:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	24504		

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## 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		<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	13493491	2012-06-11		
Prior Application Status	Patented		<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13493491	Continuation of	12961045	2010-12-06	8197706	2012-06-12
Prior Application Status	Abandoned		<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12961045	Continuation of	10937736	2004-09-08		
Prior Application Status	Expired		<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
10937736	Claims benefit of provisional	60501049	2003-09-08		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.					

## 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)<sup>i</sup> 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).

Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	<a href="#">Remove</a>
			Access Code <sup>i</sup> (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.			

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

<p>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.</p> <p><input type="checkbox"/> 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.</p>	
--	--

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	821920-1033
	Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT	

## 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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## 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.			
<b>Applicant 1</b>			
<p>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.</p>			
<input type="button" value="Clear"/>			
<input type="radio"/> Assignee		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
		<input type="radio"/> Joint Inventor	
<input checked="" type="radio"/> Person to whom the inventor is obligated to assign.		<input type="radio"/> 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: <input type="text"/>			
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	<u>R421A LLC</u>		
<b>Mailing Address Information For Applicant:</b>			
Address 1	<u>610 McFarland 400 Dr.</u>		
Address 2			
City	<u>Alpharetta</u>	State/Province	<u>GA</u>
Country	<u>US</u>	Postal Code	<u>30004</u>
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

## 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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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

**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.

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 <sup>i</sup>		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.

**Signature:**

**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	/Todd Deveau/		Date (YYYY-MM-DD)	<u>03/27/2020</u>
First Name	Todd	Last Name	Deveau	Registration Number 29526

Additional Signature may be generated within this form by selecting the Add button.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	821920-1033
	Application Number	<u>15/989,655</u>
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT	

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

# Privacy Act Statement

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

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

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

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	38990611
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	27-MAR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	14:00:28
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_R421A-signed.pdf	578816	no	1
			d801bf7cee80e0d9ae78c102de8404d0a2a70e78		

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 128 of 322

<b>Information:</b>					
2	Assignee showing of ownership per 37 CFR 3.73	821920-1033__AIA_96_Statement_Under_37CFR_3_73_c__file_with_POA_.pdf	124484 693f60b1cf0848e88f4b6db2fb2cb58c43b0eeac	no	3
<b>Warnings:</b>					
<b>Information:</b>					
3	Req to correct/update/change appl name until pay issue fee	821920-1033__Request_to_change_Applicant.pdf	218388 b621fb1d90cc361331b7031ff93596ecce140cec	no	2
<b>Warnings:</b>					
<b>Information:</b>					
4	Application Data Sheet	Corrected_ADS_1033.pdf	485656 2ce0575f6ee7659cdbac72d1abc819fa823a36fd	no	9
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
<b>Total Files Size (in bytes):</b>			1407344		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033

24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

**CONFIRMATION NO. 5897**  
**IMPROPER CPOA LETTER**



Date Mailed: 03/17/2020

**NOTICE REGARDING POWER OF ATTORNEY**

This is in response to the power of attorney filed 03/12/2020. The power of attorney in this application is not accepted for the reason(s) listed below:

- The signature(s) of Steffan Thomas, co-inventor(s) in this application, has/have been omitted. The power of attorney will be entered upon receipt of confirmation signed by said co-inventor(s).

/dgela/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**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
15/989,655	May 25, 2018

(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:

24504

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)

Name

Kenneth M. Ponder

Title

Owner / President

**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 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.

Dynatemp v. R421A - IPR2020-01660

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## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	38843068
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	12-MAR-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:27:51
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	821920-1033__POA.pdf	583169	no	1
			24c20dcbbd521ff9382c6a4ffa7521613d627adff		

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 132 of 322



<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	583169
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897
24504	7590	03/09/2020	EXAMINER	
THOMAS   HORSTEMEYER, LLP 3200 WINDY HILL ROAD, SE SUITE 1600E ATLANTA, GA 30339			HARDEE, JOHN R	
			ART UNIT	PAPER NUMBER
			1761	
			NOTIFICATION DATE	DELIVERY MODE
			03/09/2020	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):

docketing@thomashorstemeyer.com  
ozzie.liggins@tkhr.com  
uspatents@tkhr.com



## DETAILED ACTION

### *Notice of Pre-AIA or AIA Status*

1. The present application is being examined under the pre-AIA first to invent provisions.

### *Double Patenting*

2. Claims 30, 32, 34 and 37-40 remain rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 8,197,706 and claims 1-37 of U.S. Patent 9,982,179 for the reasons of record in the previous office action.

3. **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.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, Dr. John R. Hardee, whose telephone number is (571) 272-1318. The examiner can normally be reached on Monday through

Friday from 8:00 until 4:30. In the event that the examiner is not available, his supervisor, Mr. Harold Pyon, may be reached at (571) 272-1498.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8100. Please note that examiners may not accept or enter faxed amendments.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/JOHN R HARDEE/  
Primary Examiner  
Art Unit 1761

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	15989655
	Filing Date	2018-05-25
	First Named Inventor	Kenneth M. Ponder
	Art Unit	1761
	Examiner Name	Hardee, John R.
	Attorney Docket Number	821920-1033

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

1	List of refrigerants from Wikipedia, <a href="https://en.wikipedia.org/wiki/List_of_refrigerants">https://en.wikipedia.org/wiki/List_of_refrigerants</a> , last modified on 19 January 2017, 13 pages
2	Environmental Protection Agency (EPA), Air and Radiation Stratospheric Protection Division 6205J, "Substitute Refrigerants Under SNAP as of October 4, 2011", SNAP Information: <a href="http://www.epa.gov/ozone/snap">http://www.epa.gov/ozone/snap</a> , 18 pages
3	Summary of Substitute Refrigerants Listed in SNAP Notice 25, 10 pages
4	ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s, and u to ANSI/ASHRAE Standard 34-2004, "Designation and Safety Classification of Refrigerants", 2006 Supplement, ISSN 1041-2336, 35 pages

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

**EXAMINER SIGNATURE**

Examiner Signature	/JOHN R HARDEE/ (03/02/2020)	Date Considered	03/02/2020
--------------------	------------------------------	-----------------	------------

\*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.

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**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.

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

None

**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	/Todd Deveau/	Date (YYYY-MM-DD)	2020-02-24
Name/Print	Todd Deveau	Registration Number	29526

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



## Privacy Act Statement

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

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

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

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.

<b>PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)</b>		Docket Number (Optional) <b>821920-1033</b>
Application Number <b>15/989,655</b>	Filed <b>May 25, 2018</b>	
For <b>REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT</b>		
Art Unit <b>1761</b>	Examiner <b>Hardee, John R.</b>	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>	
<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ _____
<input checked="" type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ <u>300.00</u>
<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ _____
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____

☒ Applicant asserts small entity status. See 37 CFR 1.27.☐ Applicant certifies micro entity status. See 37 CFR 1.29.  
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 has already been authorized to charge fees in this application to a Deposit Account.☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to  
Deposit Account Number 20-0778.☒ Payment made via EFS-Web.**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/inventor.☐ assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).☒ attorney or agent of record. Registration number 29,526.☐ attorney or agent acting under 37 CFR 1.34. Registration number \_\_\_\_\_./Todd Deveau/February 24, 2020

Signature

Date

Todd Deveau770-933-9500

Typed or printed name

Telephone Number

**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\*.☐ \* Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

## 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Confirmation No.: 1039

Ponder et al.

Group Art Unit: 1761

Serial No.: 13/493,491

Examiner: Hardee, John R.

Filed: June 11, 2012

Docket No. 821920-1032

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

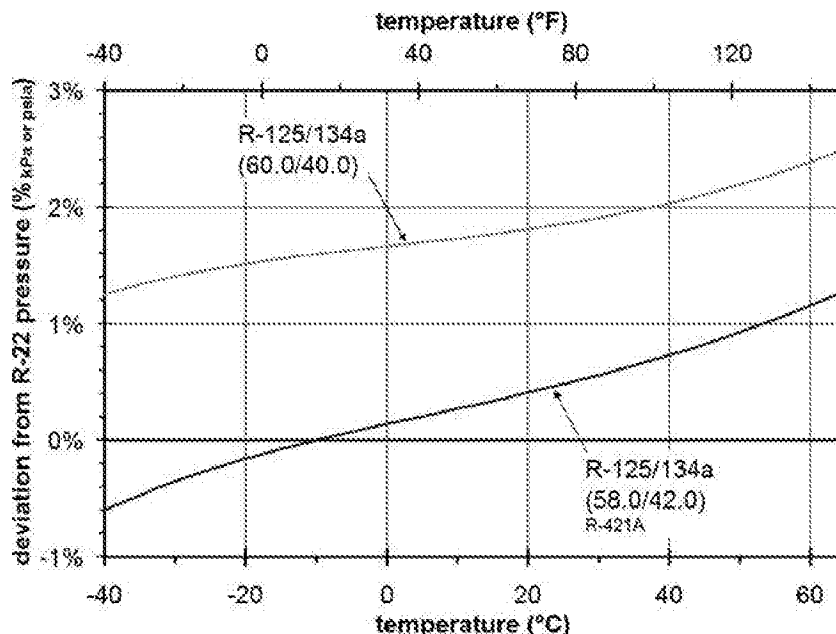
**SECOND DECLARATION OF KENNETH M. PONDER**

I, Kenneth M. Ponder, hereby declare as follows:

1. I am the President of RMS of Georgia, LLC and am a co-inventor named on the above application.
2. RMS of Georgia, LLC sells and distributes refrigerants and reclaims most refrigerants.
3. Among the refrigerants that RMS of Georgia, LLC sells and distributes are refrigerants known under ASHRAE designations R-421A and R-421B. Our R-421A and R-421B refrigerants are approved by ASHRAE and are SNAP approved by the U.S. Environmental Protection Agency (EPA) for use with or as a replacement or substitute for R-22 refrigerant for different uses, as described below. The refrigerant having the ASHRAE designation R-421A is a refrigerant composition of my present application that is a mixture of R-125 (pentafluoroethane) and R-134a (1,1,1,2-tetrafluoroethane) as the only refrigerant gases blended with a lubricant in which R-125 is present in an amount of  $58\% \pm 1\%$  by weight and R-134a is present in an amount of  $42\% \pm 1\%$  by weight of the two refrigerant gases wherein the combined weight of the two gases totals 100%.
4. An accepted guide for refrigerant designations is ASHRAE Standard 34. Based on assignment in prior editions and addenda thereto, Addendum O, Table 2

to ASHRAE Standard 34-2004 identifies my R-421A-series refrigerant blend (along with adopted safety data and classifications for them) as a composition of R-125 and R-134a with formulation and tolerances of: “R-421A: R-125/134a (58.0% / 42.0%) ( $\pm 1.0/\pm 1.0$ ).” As such, a composition of 60% R-125 / 40% 134a (60.0/40.0) is considered by ASHRAE as distinct from R-421A [58% R-125 / 42% 134a (58.0/42.0)] and does not fall within ASHRAE’s formulation tolerances ( $\pm 1.0/\pm 1.0$ ). Stated another way, a 60.0/40.0 (or “60/40”) composition cannot be identified as within ASHRAE’s designation and tolerances for a refrigerant designated or labeled R-421A. Were one to seek a Standard Designation for 60% R-125 / 40% 134a (60.0/40.0), it would be given consideration for a separate ASHRAE designation, in accordance with ASHRAE Standard 34.

5. The following figure shows the difference in deviations from the HCFC refrigerant R-22 (chlorodifluoromethane), the most widely used refrigerant from the late 1950s until 2010 and that most commonly used in residential air conditioners among other applications. Many blends, including R-421A (58% R125 / 42% R134a), were developed for and are marketed as Freon – 22 (R-22) replacements with the phase-out of ozone-depleting substances, of which Freon – 22 (R-22) is one.

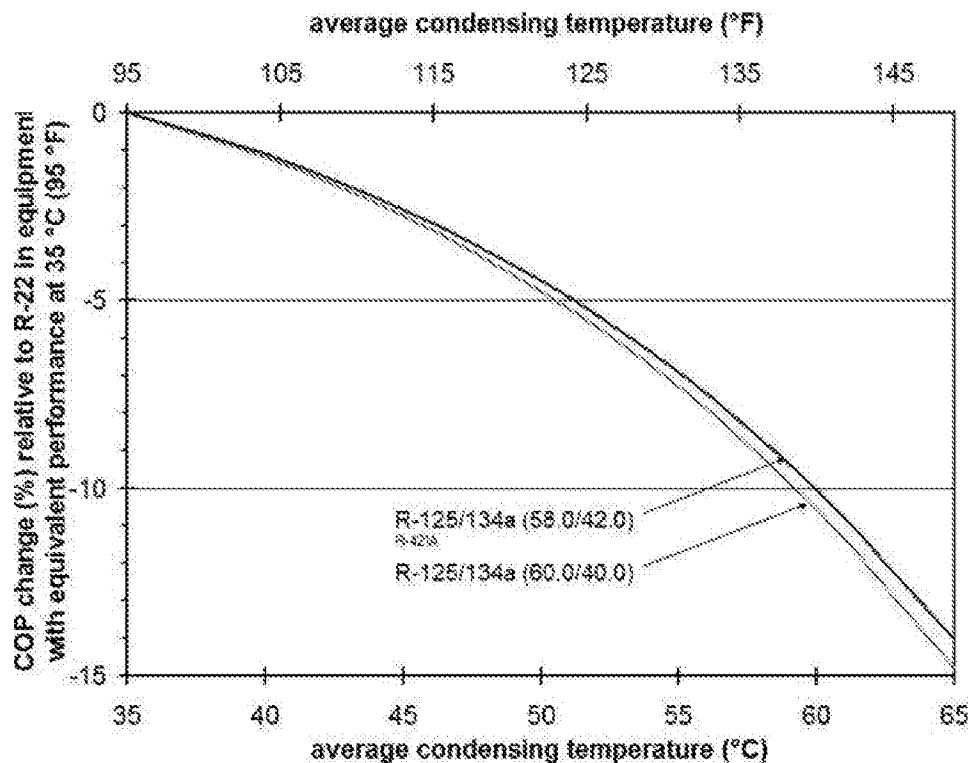


6. As shown in the above figure, R-421A [58% R-125 / 42% R134a (58.0/42.0)] offers a **much closer approximation of the thermodynamic R-22 pressure-temperature (P-T) characteristics** than 60% R-125 / 40% R134a (60.0/40.0), an important consideration for replacement of the HCFC refrigerant Freon – 22 (R22) and for retrofit and specifically for thermostatic expansion valve control of refrigerant flow metering in air conditioning and refrigeration machinery. Over the temperature range of -40 to +65 °C (-40 to +149 °F), the pressure deviation in (kPa or psia) for R-421A [58% R-125 / 42% R134a (58.0/42.0)] compared to Freon -22 (R-22) deviates by -0.6 to +1.3% as contrasted to 1.3 to 2.5% for 60% R-125 / 40% R134a (60.0/40.0) with average deviations of 0.3% and 1.8%, respectively. Restated in terms of gauge pressure (psig), the corresponding ranges are -16.1 to 1.4% for and 33.9 to 2.6% with averages of -0.5 and 4.0%. In short, unexpectedly R-421A [58% R-125 / 42% R134a (58.0/42.0)] better approximates the pressure-temperature (P-T) characteristics of Freon (R-22) than 60% R-125 / 40% R134a (60.0/40.0).

7. For the evaporating temperature span of primary interest as a replacement for the HCFC refrigerant Freon – 22 (R-22) in air conditioning and refrigeration, namely -20 to +10 °C (-4 to +14), the average pressure deviation compared to Freon – 22 (R-22) on an absolute pressure basis for R-421A [58% R-125 / 42% R134a (58.0/42.0)] is approximately 5% that of 60% R-125 / 40% R134a (60.0/40.0).

8. Predicated on a representative average evaporating temperature of 10 °C (50 °F) without superheat, R-421A [58% R-125 / 42% R134a (58.0/42.0)] outperforms 60% R-125 / 40% R134a by 0.15 to 1.04% for average condensing temperatures spanning 35-65 °C (95-149 °F) without sub-cooling. The calculations are based on theoretical-cycle calculations discounting compressor and motor efficiency, fan power and similar parasitic losses and also assuming ideal heat transfer and fluid flow; these

simplifications actually give a very slight advantage to the less-efficient refrigerant option. The following doubly-normalized figure shows the comparative performance losses with increasing condenser temperatures (when cooling is most needed) for such idealized cycles predicated on equipment modification to yield the same nominal coefficient of performance (COP) for Freon – 22 (R-22) and the two substituted blends at the common rating condition of 35 °C (95 °F) condensing:



9. As shown, R-421A [58% R-125 / 42% R134a (58.0/42.0)] unexpectedly outperforms the 60% R-125 / 40% R134a (60.0/40.0)] composition for the full range, but its advantage grows at higher temperatures, namely when air conditioning and refrigeration loads increase (i.e., when most needed). The higher temperatures also are when utility demand rates kick in when applicable (normally for commercial and industrial but not for residential rates). Stated another way, **unexpectedly the “58/42”**

**[R-421A (58% R125 / 42% R134a)] composition benefits are greatest when most needed** as compared to a 60% R125 / 40% R134a composition.

10. The lower fraction of R-125 (with five fluorine atoms per molecule compared to four in the R-134a component) for R-421A [58% R-125 / 42% R134a (58.0/42.0)] implies additional advantages compared to 60% R-125 / 40% R134a (60.0/40.0). First, the lower fluorination implies a slightly lower cost under rational pricing scenarios. Second, the Global Warming Potential (GWP), an indicator of potency as a greenhouse gas relative to carbon dioxide for 100 year integration (the value most often cited and used in treaties and regulations) for R-421A [58% R-125 / 42% R134a (58.0/42.0)] is 2380 compared to 2420 for 60% R-125 / 40% R134a (60.0/40.0); the 1.7% lower (more favorable) value is again due to the lower fraction of R-125 in R-421A [58% R125 / /42% R134a] as compared to 60% R125 / /40% R134a.

11. Attached is a Summary and a Table of Substitute Refrigerants Listed in SNAP Notice 25. The Table provides a listing of refrigerants acceptable as substitute to HCFC-22 (chlorodifluoromethane). This SNAP Notice 25 and the Table are issued by the EPA. The Table includes approximately 45-50 refrigerants determined by the EPA to be acceptable as substitutes for HCFC-22. This Table includes not only my refrigerant designated as R-421A by ASHRAE but also the following refrigerants, among others:

- 1) R125/R290/R134A/R600A in a ratio of 55/1/42.5/1.5% by weight;
- 2) R32/R125/R134A in a ratio of 20/40/40% by weight (known as R407A);
- 3) R125/R134A/R600A in a ratio of 46.6/50.0/3.4% by weight (R417A);
- 4) R125/R134A/R600A in a ratio of 55.0/42.0/3.0 (R422B);
- 5) R125/R134A/R600A/R600/R601A in a ratio of 50.5/47.0/0.9/1.0/0.6% by weight (R424A); and
- 6) R125/R134A in a ratio of 50/50% by weight (R507A).



12. As seen from the SNAP Table, not all combinations of HFC-125 (pentafluoroethane) and HFC-134a (1, 1, 1, 2-tetrafluoroethane) are suitable for use with or as a substitute or a replacement for R-22 (HCFC-22, chlorodifluoromethane). For Example, R416A (134a/125/600 in the ratio 59.0 (+0.5, -1.0)/39.5 (+1.0,-0.5)/1.5 (+1.0,-0.5) is not listed as a suitable replacement for either CFC-11 or HCFC-22. In fact, the only combination of HFC-125 and HFC-134a to the exclusion of other refrigerant gases, such as R290 and R600, that are SNAP approved by the EPA to be suitable for use with or as a substitute or a replacement for the HCFC refrigerant R-22 are our R-421A and R-421B refrigerants.

13. In fact, there are HCFC refrigerants and combinations of R-125 and R-134a that are suitable for use with or as a substitute or a replacement for R-22 (HCFC-22) but not for R-12 (CFC-12) and vice versa. HCFC 125 is an acceptable substitute for CFCs but not HCFC-22. Examples are provided in Table 1 and Table 2 below:

Table 1  
In Air Conditioning

	CFC	HCFC-22
HCFC 123	Yes	No
HCFC 125	Yes	No
HFC 236	Yes	No
R-290	No	Yes
R401A,B	Yes	No
R404A	No	Yes
R-406A	Yes	No
R407A	No	Yes
R409A	Yes	No
R410A,B	No	Yes
R416A	No	No
R417A	No	Yes
R421A	No	Yes
R422B	No	Yes
R424A	No	Yes

Table 2  
In Commercial Refrigeration

	CFC	HCFC-22
HCFC 22	Yes	No
HCFC 152B	No	Yes
HFC 236	Yes	No
R290	No	Yes

R401A,B	Yes	No
R402A,B	Yes	No
R406A	Yes	No
R408A	Yes	No
R409	Yes	No
R410A,B	No	Yes
R411A,B	Yes	No
R416A	No	No
R417A	No	Yes
R421A	No	Yes
R422B	No	Yes
R424A	No	Yes

14. Attached hereto is a Table 7 including a listing of the refrigerants that are primarily offered in competition to my R-421A refrigerant along with their respective dew points and bubble points. The bubble point and dew point for HCFC-22 are -41.46 and -41.46°F, respectively. While the bubble point for my R-421A refrigerant closely approximates that of HCFC-22, the blend dew point does not; yet as shown above my R-421A refrigerant performs surprisingly well as a substitute for HCFC-22. In fact, I have found that to adjust the ratio of R125 and R134a in my refrigerant blend away from its 58% (±1.0 %) R125 and 42% (±1.0) so the its dew point of about -32°F (in particular, -31.65°F) more closely matches the dew point of HCFC-22 would negatively impact the aforementioned Global Warming Potential (GWP) of my refrigerant.

15. I have read US Patent No. 6,207,071 that I understand is cited against my above application. I do not find any teaching therein on how to select or design a refrigerant composition to serve as a substitute specifically for HCFC-22. There is a general statement in column 1, lines 21-27, to the use of "CFC (chlorofluorocarbon) and HCFC (hydrochlorofluorocarbon)" is now restricted. This statement, however, does not specifically identify HCFC-22 (chlorodifluoromethane). Moreover, there is no mention, let alone any suggestion, in Takigawa of considering the bubble point and/or dew point of a refrigerant blend of refrigerants in designing a blend of refrigerant gases to serve as a substitute for HCFC-22.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this patent.

Respectfully submitted,

Date: September 28 2017

  
Kenneth M. Ponder

# **ATTACHMENT OF TABLE 7**

Comparative Properties and Efficiency of R-421A for Retrofit Use to Replace R-22  
James M. Cahn, Engineering Consultant, USA

JSSC/RMS-1312a  
2013.12.26

Table 7: Data for Selected Refrigerants (IP units)

properties	R-22	R-407C	R-410A	R-421A	R-422B	R-422D	R-427A	R-438A
molar mass (lb/mol)	0.109629	0.100046	0.160023	0.346359	0.239242	0.242365	0.198395	0.218478
normal boiling point (NBP)								
bubble point for blends (°F)	-41.48	-48.53	-60.00	-41.22	-42.36	-45.78	-45.33	-44.18
dew point for blends (°F)	-41.48	-33.93	-60.46	-31.85	-32.59	-37.01	-35.16	-33.65
maximum temperature glide								
at NBP (°F)	0.000	12.597	0.142	9.568	0.769	8.747	12.164	11.540
at 88 °F (°F)	0.000	18.005	0.208	6.582	6.234	6.373	9.323	8.608
density at NBP								
saturated liquid (lb/ft <sup>3</sup> )	87.37	88.19	84.28	91.18	97.26	97.81	85.48	86.84
saturated vapor (lb/ft <sup>3</sup> )	6.2936	6.2891	6.2506	6.3731	6.3832	6.3718	6.3030	6.3319
latent heat of vaporization								
at NBP (Btu/lb)	100.8	107.2	117.4	82.5	84.2	81.8	101.8	92.8
at NBP (Btu/lb) vapor	29.53	35.88	30.00	30.78	30.86	30.49	30.83	30.83
at 140 °C (Btu/lb)	60.23	58.29	45.22	41.48	41.78	37.84	53.00	47.28
saturated vapor pressure								
at 88 °F (psia)	132.8	127.7	208.3	118.8	128.7	131.1	184.2	122.8
at 140 °F (psia)	352.1	368.8	556.1	338.3	345.3	364.3	355.0	349.7
critical point								
temperature (°F)	209.1	168.0	160.4	181.0	181.0	179.2	188.0	188.3
pressure (psia)	723.7	871.4	710.8	588.4	574.8	589.3	637.0	624.3
specific volume (ft <sup>3</sup> /lb)	0.0908	0.0331	0.5548	0.0281	0.0304	0.0303	0.0327	0.0314
ozone depletion potential (ODP) relative to R-11								
scientific	0.04	0	0	0	0	0	0	0
regulatory (MP)	0.055							
global warming potential (GWP) for 100 yr ITH								
scientific relative to CO <sub>2</sub>	1750	1703	2103	2603	2503	2703	2100	2200
ASHRAE 34 / ISO 817 safety classification	A1	A1	A1	A1	A1	A1	A1	A1
ASHRAE 34 Refrigerant Concentration Limit (RCL) (lb/Mcf)	19	18	28	17	18	18	16	4.9

The grey regions of Table 6 and Table 7 indicate inapplicable data, namely the absence of composition-based glide based for the single-compound R-22. They also signify inapplicable data for blends not directly regulated by ozone depletion potential (ODP) in international treaties (notably the Montreal Protocol) and most regulations, though regulatory consequences result indirectly based on mass-weighted formulations of the blends.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	15989655
	Filing Date	2018-05-25
	First Named Inventor	Kenneth M. Ponder
	Art Unit	1761
	Examiner Name	Hardee, John R.
	Attorney Docket Number	821920-1033

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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

1	List of refrigerants from Wikipedia, <a href="https://en.wikipedia.org/wiki/List_of_refrigerants">https://en.wikipedia.org/wiki/List_of_refrigerants</a> , last modified on 19 January 2017, 13 pages
2	Environmental Protection Agency (EPA), Air and Radiation Stratospheric Protection Division 6205J, "Substitute Refrigerants Under SNAP as of October 4, 2011", SNAP Information: <a href="http://www.epa.gov/ozone/snap">http://www.epa.gov/ozone/snap</a> , 18 pages
3	Summary of Substitute Refrigerants Listed in SNAP Notice 25, 10 pages
4	ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s, and u to ANSI/ASHRAE Standard 34-2004, "Designation and Safety Classification of Refrigerants", 2006 Supplement, ISSN 1041-2336, 35 pages

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**EXAMINER SIGNATURE**

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

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



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

Application Number	15989655
Filing Date	2018-05-25
First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	Hardee, John R.
Attorney Docket Number	821920-1033

**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.

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

None

**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	/Todd Deveau/	Date (YYYY-MM-DD)	2020-02-24
Name/Print	Todd Deveau	Registration Number	29526

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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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
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## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	15989655			
<b>Filing Date:</b>	25-May-2018			
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT			
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder			
<b>Filer:</b>	Todd Deveau./Sheila Gray			
<b>Attorney Docket Number:</b>	821920-1033			
Filed as Small Entity				
<b>Filing Fees for    Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 2 months with \$0 paid	2252	1	300	300
<b>Miscellaneous:</b>				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
<b>Total in USD (\$)</b>				<b>420</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	38666303
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	24-FEB-2020
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	10:59:41
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$420
RAM confirmation Number	E20202NA59571374
Deposit Account	200778
Authorized User	Sheila Gray

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:  
37 CFR 1.21 (Miscellaneous fees and charges)

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 161 of 322

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	821920-1033__Response_to_Office_Action_dated_9-24-19.pdf	335700	no	17
			48264298cc3b1a16984c23bb1a328e4c912fba9a		
<b>Warnings:</b>					
<b>Information:</b>					
2	Extension of Time	821920-1033__2_mth_EOT_small_.pdf	189388	no	2
			a445cced04259a39cbea8813848ddd56c456791		
<b>Warnings:</b>					
<b>Information:</b>					
3	Oath or Declaration filed	8219201032_Second_Declaration_of_Kenneth_M_Ponder.pdf	1001872	no	11
			6674040938b8eec5c434e27dc2f179c8e5f422f7		
<b>Warnings:</b>					
<b>Information:</b>					
4	Information Disclosure Statement (IDS) Form (SB08)	IDS_Form_1449__Submit_w-Response_.pdf	614867	no	4
			a5ff172d77c1a06c6fbac37df2f6d54adc449170		
<b>Warnings:</b>					
<b>Information:</b>					
<p>A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.</p>					
5	Non Patent Literature	Ref1.pdf	1579294	no	13
			8604eecb1ed19c5639441fe68b0c7e1525dde2f2		
<b>Warnings:</b>					
<b>Information:</b>					

6	Non Patent Literature	Ref2.pdf	1452378	no	18
			8a71bae44f761a1142be91f39249c84796805498		
Warnings:					
Information:					
7	Non Patent Literature	Ref3.pdf	361311	no	10
			4c4c102c4d969d48a7fa88118c89180524c21f1b		
Warnings:					
Information:					
8	Non Patent Literature	Ref4.pdf	2513008	no	35
			d63e0d460399b496d273b700f5c8d27a1a86c0df		
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	32424	no	2
			20576c4a6189ba1f0d9aa32de65b10da1c12097d		
Warnings:					
Information:					
Total Files Size (in bytes):			8080242		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> 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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> 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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> 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.</p>					

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

Kenneth M. Ponder

Group Art Unit: 1761

Serial No.: 15/989,655

Examiner: Hardee, John R.

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**

**RESPONSE TO NON-FINAL OFFICE ACTION**

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

Sir:

The Non-Final Office Action from Examiner John R. Hardee mailed on September 24, 2019 (Paper No./Mail Date 20190918), has been received and reviewed. Applicants provide the following remarks in response.

**AUTHORIZATION TO DEBIT ACCOUNT**

A petition for a two-month extension of time is herein submitted. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefore (including fees for net addition of claims) are hereby authorized to be charged to deposit account no. 20-0778.



**IN THE CLAIMS:**

1-29. (Cancelled)

30. (Currently Amended) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition designed to achieve a phase change, the refrigerant composition comprising a combination of refrigerant gases, said refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight of the pentafluoroethane and tetrafluoroethane on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

31. (Cancelled)

32. (Previously Presented) A method for refilling an apparatus designed for use with a chlorodifluoromethane refrigerant, the method comprising:

(1) selecting a substitute refrigerant composition designed to achieve a phase change and comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight of the pentafluoroethane and tetrafluoroethane on the basis of the combined

weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the tetrafluoroethane is 1,1,1,2- tetrafluoroethane, and

(2) supplying the substitute refrigerant composition under pressure, in a cylinder can fitted with an outlet compatible with a chlorodifluoromethane recharging manifold of the apparatus.

33. (Cancelled)

34. (Currently Amended) A refrigerant composition comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, wherein in the refrigerant composition said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight ~~of the combined weight of the pentafluoroethane and tetrafluoroethane~~ on the basis of the combined weights of said pentafluoroethane, and said tetrafluoroethane totaling 100% and wherein ~~the~~ said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

35-36. (Cancelled)

37. (Previously Presented) In the apparatus of claim 30, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

38. (Previously Presented) In the apparatus of claim 30, wherein the refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

39. (Previously Presented) The method according to claim 32, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

40. (Currently Amended) The method according to claim 32, wherein the substitute refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion ~~inhibit~~ inhibitor, a surfactant, a foaming agent, and mixtures thereof.

41-46. (Cancelled)

**REMARKS**

The Office Action presents two issues, namely: 1) an objection to claim 40; and 2) claims 30, 32, 34, and 37-40 stand rejected under 35 U.S.C. §103(a) as obvious in view of US 6,207,071 (Takigawa et al.).

Applicants note the kind statement in Section 8 at page 6 of the Office Action that: "Submission of the declarations which were submitted in the parent case would further prosecution." Applicants respectfully submit this information herein and in response to the Office Action.

First, regarding the objection to claim 40, Applicants have amended the claim as kindly suggested to correct the spelling of the term "inhibitor."

Second, Applicants respectfully submit that the declarations and supporting information demonstrate:

- 1) the unexpected benefits of the refrigerant of the present claims;
- 2) that unexpectedly adjusting the present refrigerant blend so that the refrigerant more closely matches that of R-22 for which it is to serve as a substitute would negatively impact the GWP of the Applicants' refrigerant blend;
- 3) there is no teaching or suggestion in *Takigawa* determining a refrigerant blend that can serve as a substitute for HCFC-22 (R-22);
- 4) that, while the Office asserts that *Takigawa* reads on refrigerant compositions consisting of 40-60% R134a and 60-40% R125 and infers that *Takigawa* provides motivation to experiment within "the relatively narrow range of 40:60 to 60:40 pentafluoroethane to tetrafluoroethane, the Office fails to identify any purpose or objective allegedly taught by *Takigawa* for such blind experimentation;
- 5) that a range of 40:60 to 60:40 is not at all a "relatively narrow range in the refrigerant field"; and

- 6) that various refrigerant blends within the 40:60 to 60:40 range are not suitable as substitutes for various types of refrigerants including, in particular, HCFC-22.

Thus, Applicants respectfully request reconsideration based upon the amendments and remarks presented herein.

The presently pending claims are directed to a refrigerant “consisting of a blend of tetrafluoroethane and pentafluoroethane wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein said tetrafluoroethane is 1,1,1,2- tetrafluoroethane.”

See claims 30, 32, and 34.

The Second Declaration of Kenneth M. Ponder (dated March 28, 2017 submitted in regards to Applicants’ application no. 13/493,491 and resubmitted herein) demonstrates the unexpected benefits provided by the above referenced refrigerant composition of the present claims. They show that the refrigerant recited in the present claims more closely approximates characteristics of HCFC-22 than the 60/40 composition asserted as the closest prior art, particularly within the temperature range most needed for the refrigerant.

Additionally, the evidence shows that unexpectedly adjusting the refrigerant blend so that the refrigerant blend more closely approximates that of HCFC-22 negatively impacts the Global Warning Potential (GWP) of the blend. Moreover, the present refrigerant blend while having been determined by the trade association as an acceptable substitute for HCFC-22, it is not an acceptable substitute for refrigerant R-11.

Applicants respectfully submit that when a rejection is made for obviousness, there must be some teaching or suggestion found in the prior art to modify the teachings of the prior art to meet all of the elements of a claim. The Office Action, in effect, concedes that *Takigawa* does not

provide any such teaching or suggestion in regards to finding or determining a substitute for R-22 to reach the refrigerant composition of the present claims.

Further, Applicants note that *Takigawa* fails to provide any teaching for identifying or determining a substitute refrigerant for R-22.

Instead, the Office Action asserts: "It would have been obvious at the time the invention was made to make such a composition, because this reference teaches that all of the ingredients recited by appellants are suitable for inclusion in a refrigerant composition. The person of ordinary skill in the refrigeration art would expect the recited compositions to have properties similar to those compositions which are exemplified, absent a showing to the contrary."

This amounts, in effect, to an assertion that *Takigawa* provides "motivation to experiment". However, the Office Action fails to comment or explain where the motivation comes from. Stated another way, what purpose can the Office point to in *Takigawa* for such "motivation to experiment"? Applicants submit that experimentation for experimentation sake - without any purpose or objective - fails to meet the evidence required to support a rejection for obviousness.

Further, the Action appears to suggest that *Takigawa* provides motivation to experiment within the range of 40:60 to 60:40 mixtures of R-125 and R-132A. Applicants show, however, that the trade does not consider a range of from 40:60 to 60:40 to be a "relatively narrow range". In fact, the trade association, ASHRAE, considers this is unacceptably large range when refrigerants are defined by percentages of, for example,  $\pm 1\%$  and not an overall range of 20%. This is shown, for example, by NPL4 resubmitted herewith, namely the ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s, and u to ANSI/ASHRAE Standard 34-2004, in which it can be seen the industry standard composition deviation is typically plus or minus 1%, and for Applicants' R421A having 58% R125 and 42% R134a in particular is plus or minus 1% (page 13).

Additionally, the evidence shows that refrigerants within such range of 40:60 to 60:40 would not behave identically, nor could they be expected to behave in a particular manner. For example, refrigerant blends within such range may be found to be acceptable as a substitute for

one type of refrigerant but not another type of refrigerant. More particularly, the evidence shows that there are refrigerants that could be considered within the range of 40:60 to 60:40 that are not suitable as substitutes for R-22.

Moreover, the Office Action seems to rely on a blind “obvious to try” standard since it does not point to anywhere in *Takigawa* where there is any suggestion as what one may be trying to achieve by such “obvious to try” experimentation. Without evidence of motivation for the objective of finding a substitute for R-22, *Takigawa* cannot serve as a basis for “obvious to try” where the objective is unknown.

Stated another way, the Office Action has not stated what result-effective parameters are to be considered or involved in carrying out the blind “obvious to try” experimentation over a variation of 20% other than to find out if all compositions over the range of 20% would behave identically. This, however, would not lead one to determine an acceptable substitute for HCFC-22. Instead, such experimentation would only determine whether one composition within the 20% range behaves identically to another composition within the 20% range. As shown below, however, not all refrigerant blends within the 20% range would be considered to behave identical. Then what is the purpose for the alleged “obvious to try” experimentation? Without the hindsight guidance of Applicants’ specification why would one conduct such experimentation?

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as “a routine experimentation”. In *re* *Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Only result-effective variables can be optimized. The Office fails to address this point. It fails to describe what features are result-effective variables in finding an acceptable substitute for HCFC-22 as they are used in the claimed subject matter. Specifically, the Office fails to state what the recognized result that is to be achieved. In addition, the Office does not provide any support for the assertion that these features are routinely optimized as is used in the claims. Rather, the Office seems to make a conclusory assertion that

the amounts can be optimized without a reasonable argument to support its position. Thus, the Office has not met its prima facie case of obviousness. Accordingly, the claims are novel and non-obvious over *Takigawa*.

More particularly, Applicants note the Second Declaration of Kenneth Ponder re-presented herein shows just this. As demonstrated by the Second Declaration of Kenneth Ponder and as previously argued and presented in the parent application, the composition of the present claims is designated by ASHRAE as R421a consisting of 58% (+1.0 – 1.0%) and 42% R134a (+1.0, -1.0%). See, page 13, NPL4. Furthermore, ASHRAE's designation providing formulation tolerances of +-1% for each of the 2 components shows that the composition referenced in the Office Action of 60% pentafluoroethane and 40% tetrafluoroethane does not fall within ASHRAE's designation nor within ASHRAE's formulation tolerances for the present R421a showing that ASHRAE considers a composition of 60% R125 and 40% R134a to be distinct from the present R421a. See, Second Declaration of Kenneth Ponder, paragraph 4.

Furthermore, as noted in the Second Declaration of Kenneth Ponder the present R421a composition offers a much closer approximation of the thermodynamic HCFC-22 (R22) pressure-temperature characteristics than the 60%/40% composition asserted to be taught by *Takigawa* and that such is an important consideration for replacement of HCFC-22 in for retrofit and specifically for thermostatic valve control of refrigerant flow metering and air conditioning and refrigeration machinery. In short, unexpectedly, R421a better approximates the pressure-temperature characteristics of HCFC-22 than a composition of 60% R-125 and 40% R134a. Furthermore, the R124a out performs a blend of 60% R125a and 40% R134a for average condensing temperatures. Additionally, the advantage of R421a over a 60/40% composition grows at higher temperatures, namely, when air conditioning and refrigeration modes increased, i.e., when they are most needed. Stated another way, **unexpectedly the “58/42” [R-421A (58% R125 / 42% R134a)] composition benefits are greatest when most needed** as compared to a



60% R125 / 40% R134a composition. See, Second Declaration of Kenneth Ponder, paragraphs 5-9.

These arguments are supported by the evidence submitted by way of the Second Declaration of Kenneth Ponder and also the Supplemental Information Disclosure Statement submitted herewith, including NPL4.

Also, submitted with the Supplemental Information Disclosure Statement herewith are copies of the EPA's listing of Substitute Refrigerants Under SNAP as of October 4, 2011 (NPL2) that provides a list of acceptable substitutes for Class I (CFCs) under the SNAP program as of October 4, 2011 and the EPA's Summary of Substitute Refrigerants Listed in SNAP Notice 25 (NPL3) providing a listing of refrigerant substitutes for HCFC-22 (chlorodifluoromethane). Comparing the two lists one finds the following comparison of many refrigerants that are listed as a suitable replacement for one but not the other. Examples are provided in Tables 1 and 2 below. See, Second Declaration of Kenneth Ponder, paragraph 13.

Table 1

In Air Conditioning

	CFC	HCFC-22
HCFC 123	Yes	No
HCFC 125	Yes	No
HFC 236	Yes	No
R-290	No	Yes
R401A,B	Yes	No
R404A	No	Yes
R-406A	Yes	No
R407A	No	Yes
R409A	Yes	No

R410A,B	No	Yes
R416A	No	No
R417A	No	Yes
R421A	No	Yes
R422B	No	Yes
R424A	No	Yes

Table 2

In Commercial Refrigeration

	CFC	HCFC-22
HCFC 22	Yes	No
HCFC 152B	No	Yes
HFC 236	Yes	No
R290	No	Yes
R401A,B	Yes	No
R402A,B	Yes	No
R406A	Yes	No
R408A	Yes	No
R409	Yes	No
R410A,B	No	Yes
R411A,B	Yes	No
R416A	No	No
R417A	No	Yes
R421A	No	Yes
R422B	No	Yes
R424A	No	Yes

Thus, just because a refrigerant may be suitable or acceptable as a replacement for some CFC refrigerant, that neither *Takigawa* - nor the Office - identifies, does not automatically render it suitable for replacement of an HCFC refrigerant, and vice versa. In fact R416A (134a/125/600 in the ratio 59.0 (+0.5, -1.0)/39.5 (+1.0,-0.5)/1.5 (+1.0,-0.5) is not listed as a suitable replacement for either CFC-11 or HCFC-22. Further, there is simply no teaching or suggestion for such in *Takigawa*. This demonstrates the unpredictability in the art.

Attached hereto is a Table 7 including a listing of the refrigerants that are primarily offered in competition to my R-421A refrigerant along with their respective dew points and bubble points. The bubble point and dew point for HCFC-22 are -41.46 and -41.46°F, respectively. While the bubble point for my R-421A refrigerant closely approximates that of HCFC-22, the blend dew point does not; yet as shown above my R-421A refrigerant performs surprisingly well as a substitute for HCFC-22. In fact, the inventors found that to adjust the ratio of R125 and R134a in their refrigerant blend away from its 58%  $\pm$  1.0% R125 and 42%  $\pm$  1.0% R134a so the dew point more closely matches the dew point of HCFC-22 would negatively impact the aforementioned Global Warming Potential (GWP). See, Second Declaration of Kenneth Ponder, paragraph 14.

Moreover referring again to the "Summary of Substitute Refrigerants Listed in SNAP Notice 25," Applicants note that their present invention has received SNAP approval as a replacement for HCFC-22, but not CFC-11. The Summary includes a Table of SNAP approved refrigerant substitutes for HCFC-22 (chlorodifluoromethane) that lists approximately 45 to 50 differing refrigerant blends that are all approved substitutes for HCFC-22, including Applicants' present invention. This SNAP listing refutes the inference that the present invention is a "mere" optimization of the teachings of *Takigawa*, or stated in another way that it is simply "obvious to try" the teachings of *Takigawa* to arrive at the present invention. In view of the number of refrigerants listed as acceptable substitutes it appears the odds would be extremely low that one

would arrive at Applicants' refrigerant based on *Takigawa*. See, Second Declaration of Kenneth Ponder, paragraph 11.

Included in this SNAP listing are numerous blends of refrigerants that comprise pentafluoroethane (R-125) and tetrafluoroethane (R-134A). Further, many of such refrigerants include pentafluoroethane in a range between 60 to 40% and tetrafluoroethane in a range of 40 to 60% such as: 1) R125/R290/R134A/R600A in a ratio of 55.01/1/42.5/1.5% by weight; 2) R32/R125/R134A in a ratio of 20/40/40% by weight (known as R407A); 3) R125/R134A/R600A in a ratio of 46.6/50.0/3.4% by weight (R417A); 4) R125/R134A/R600A in a ratio of 55.0/42.0/3.0 (R422B); 5) R125/R134A/R600A/R600/R601A in a ratio of 50.5/47.0/0.9/1.0/0.6% by weight (R424A); and 6) R125/R134A in a ratio of 50/50% by weight (R507A). As seen by the ASHRAE "R" designations, each of these refrigerant blends or compositions is considered by ASHRAE to be a different refrigerant offering properties different from those of the other ASHRAE designated refrigerants. See, Second Declaration of Kenneth Ponder, paragraph 12.

In Honeywell International Inc. v. Mexichem Amanco Holding S.A.D.E.C.V. et al., Appeal No. 2016-1996, August 1, 2017) the Federal Circuit Court of Appeals reviewed and rejected arguments presented by the U.S. Patent and Trademark Office, Patent Trial and Appeal Board, in which the Board found on reexamination claims to a refrigerant namely, 1,1,1,2-tetrafluoropropene (HFO-1234YF) unpatentable on grounds that are basically the same as those presented in the present Office Action. In Honeywell, the Federal Circuit found that the Board committed legal error by improperly relying on inherency to find obviousness of the claims. Additionally, the Federal Circuit found error by the Board, while noting the overall unpredictability in the refrigerant art, the Board asserted that "routine testing" would have led to the discovery of the claimed refrigerant. The Federal Circuit rejected the Board's assertion concerning "routine testing" and reversed the rejection of the claims. The Board noted:

"A further point regarding so-called "routine testing" is that § 103 provides that "[p]atentability shall not be negated by the manner in which the invention was made." 35 U.S.C. § 103 (2012). That

provision was enacted to ensure that routine experimentation does not necessarily preclude patentability. See, e.g., *In re Saether*, 492 F.2d 849, 854 (C.C.P.A. 1974) (“In his argument that ‘mere routine experimentation’ was involved in determining the optimized set of characteristics, the solicitor overlooks the last sentence of 35 U.S.C. § 103...Here we are concerned with the question of whether the claimed invention would have been obvious at the time it was made to a person having ordinary skill in the art-not how it was achieved.” (internal citation omitted)); *In re Fay*, 347 F.2d 597, 602 (C.C.P.A. 1965) (“[W]e do not agree that ‘routine experimentation’ negatives patentability. The last sentence of section 103 states that ‘patentability shall not be negated by the manner in which the invention was made.’”).

Thus, as shown herein, the reliance on the statement: “The person of ordinary skill in the refrigeration art would expect the recited compositions to have properties similar to those compositions which are exemplified” in *Takigawa* is not correct. As shown, Applicants’ recited composition does not have properties similar to those compositions which according to the Office would also be exemplified in *Takigawa*.

**CONCLUSION**

In light of the foregoing remarks and for at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed and that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,

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# **ATTACHMENT OF TABLE 7**

Comparative Properties and Efficiency of R-421A for Retrofit Use to Replace R-22  
James M. Cain, Engineering Consultant, USA

JMC/RMS-1312a  
2013.12.26

Table 7: Data for Selected Refrigerants (IP units)

properties	R-22	R-407C	R-410A	R-421A	R-422B	R-422D	R-427A	R-438A
molar mass (lb/mol)	0.190628	0.190046	0.180023	0.240359	0.239242	0.242386	0.199385	0.218476
normal boiling point (NBP)								
bubble point for blends (°F)	-41.46	-46.53	-60.60	-41.22	-42.36	-45.76	-46.33	-44.18
blend dew point (°F)	-41.46	-33.63	-60.60	-51.66	-52.59	-37.01	-33.16	-33.05
maximum temperature glide								
at NBP (°F)	0.000	12.587	0.142	9.569	9.769	8.747	12.164	11.140
at 68 °F (°F)	0.000	19.065	0.209	6.582	6.234	5.373	9.323	8.605
density at NBP								
saturated liquid (lb/ft <sup>3</sup> )	87.97	86.19	84.26	91.19	87.28	87.81	86.46	86.64
saturated vapor (lb/ft <sup>3</sup> )	0.2836	0.2861	0.2606	0.3731	0.3632	0.3718	0.3030	0.3319
latent heat of vaporization								
at NBP (Btu/lb)	100.6	107.2	117.4	82.5	84.2	81.6	101.8	92.8
at NBP (Btu/lb) vapor	29.53	36.38	39.60	35.76	36.58	30.40	30.83	30.89
at 140 °C (Btu/lb)	90.20	56.29	45.23	41.46	41.76	37.94	53.00	47.28
saturated vapor pressure								
at 68 °F (psia)	132.8	127.7	209.3	119.0	120.7	131.1	124.2	122.8
at 140 °F (psia)	352.1	366.8	566.1	338.3	340.3	364.3	355.0	349.7
critical point								
temperature (°F)	228.1	169.8	169.4	191.0	191.8	179.2	188.0	169.0
pressure (psia)	725.7	671.4	710.9	588.4	574.0	565.3	637.0	626.3
specific volume (ft <sup>3</sup> /lb)	0.0306	0.0331	0.0349	0.0291	0.0304	0.0303	0.0327	0.0314
ozone depletion potential (ODP) relative to R-11								
scientific	0.04	0	0	0	0	0	0	0
regulatory (MP)	0.055							
global warming potential (GWP) for 100 yr (TH)								
scientific relative to CO <sub>2</sub>	1760	1700	2100	2600	2500	2700	2100	2200
ASHRAE 34 / ISO 817 safety classification	A1	A1	A1	A1	A1	A1	A1	A1
ASHRAE 34 Refrigerant Concentration Limit (RCL) BS/Mcf	13	18	25	17	16	16	16	4.9

The grey regions of Table 6 and Table 7 indicate inapplicable data, namely the absence of composition-based glide based for the single-compound R-22. They also signify inapplicable data for blends not directly regulated by ozone depletion potential (ODP) in international treaties (notably the Montreal Protocol) and most regulations, though regulatory consequences result indirectly based on mass-weighted formulations of the blends.



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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number 15/989,655		Filing Date 05/25/2018		<input type="checkbox"/> To be Mailed		
ENTITY: <input type="checkbox"/> LARGE <input checked="" type="checkbox"/> SMALL <input type="checkbox"/> MICRO										
<b>APPLICATION AS FILED - PART I</b>										
		(Column 1)	(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)				
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A	N/A						
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A	N/A	N/A						
<input type="checkbox"/> 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 =						
<input type="checkbox"/> 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).								
<input type="checkbox"/> 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						
<b>APPLICATION AS AMENDED - PART II</b>										
		(Column 1)	(Column 2)	(Column 3)						
AMENDMENT	02/24/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 7	Minus	** 20	= 0	x \$50 =		0		
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$230 =		0		
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> 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 =				
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> 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".						/SHAREILL A COLES/				
*** 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033	5897
24504	7590	09/24/2019	EXAMINER	
THOMAS   HORSTEMEYER, LLP 3200 WINDY HILL ROAD, SE SUITE 1600E ATLANTA, GA 30339			HARDEE, JOHN R	
			ART UNIT	PAPER NUMBER
			1761	
			NOTIFICATION DATE	DELIVERY MODE
			09/24/2019	ELECTRONIC

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

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

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

docketing@thomashorstemeyer.com  
ozzie.liggins@tkhr.com  
uspatents@tkhr.com



## **DETAILED ACTION**

### ***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

### ***Claim Objections***

2. Claim 40 is objected to because of the following informalities: “inhibit” should be “inhibitor”. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

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

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

4. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 30, 32, 34 and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takigawa et al., US 6,207,071. The reference discloses lubricating oil compositions and their use in compositions comprising R134a and R125 (col. 1, lines 13+). The reference further discloses the use of hydrofluorocarbons as replacements for hydrochlorofluorocarbons (col. 1, lines 20+). Suitable lubricants include the alkylbenzene oils described at col. 2, lines 30+. Refrigerants include alkane fluorides containing 40% or more of R134a in admixture with alkyl fluorides containing, most preferably, 40% or more of R125 (col. 8, lines 20+). The reference further discloses that there is "no restriction as to the kind of HFC to be mixed with" the disclosed refrigerants. The examiner takes the position that this can reasonably be construed to mean that no additional HFC need be added, and that the disclosure reads on refrigerant compositions *consisting of* 40-60% R134a and 60-40% of R125. Conventional additives may be added, including those disclosed at the top of col. 8. The examiner takes the position that anticorrosion additives are conventional, and that their use would be obvious over this disclosure. Lubricant compositions comprising naphthenic mineral oil and polyol polyesters are disclosed in Table 1. Note the disclosure in Evaluation Tests 2 and 3 of refrigerant being premixed with lubricant prior to charging a compressor. The disclosed lubricating refrigerant compositions are useful in a variety of refrigeration apparatus, as disclosed at the top of col. 9. Determination of the lubrication-effective amount of a disclosed lubricant amounts to routine optimization. This reference differs from the claimed subject matter in that it does not disclose a composition which reads on appellant's claims with sufficient specificity to constitute anticipation.

It would have been obvious at the time the invention was made to make such a composition, because this reference teaches that all of the ingredients recited by appellants are suitable for inclusion in a refrigerant composition. The person of ordinary skill in the refrigeration art would expect the recited compositions to have properties similar to those compositions which are exemplified, absent a showing to the contrary.

In the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed Cir. 1990).

### ***Double Patenting***

6. 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](http://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](http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp).

7. Claims 30, 32, 34 and 37-40 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 8,197,706 and claims 1-37 of U.S. Patent 9,982,179. Although the claims at issue are not identical, they are not patentably distinct from each other because the '179 and '706 patents

recite compositions which overlap closely with those presently recited in admixture with a lubricant, which is a conventional additive.

8. Submission of the declarations which were submitted in the parent case would further prosecution.

9. No additional art was cited with this office action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, Dr. John R. Hardee, whose telephone number is (571) 272-1318. The examiner can normally be reached on Monday through Friday from 8:00 until 4:30. In the event that the examiner is not available, his supervisor, Mr. Harold Pyon, may be reached at (571) 272-1498.


The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8100. Please note that examiners may not accept or enter faxed amendments.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/JOHN R HARDEE/  
Primary Examiner  
Art Unit 1761





<b><i>Search Notes</i></b> 	<b>Application/Control No.</b> 15/989,655	<b>Applicant(s)/Patent Under Reexamination</b> Ponder et al.
	<b>Examiner</b> JOHN R HARDEE	<b>Art Unit</b> 1761

<b>CPC - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>

<b>CPC Combination Sets - Searched*</b>		
<b>Symbol</b>	<b>Date</b>	<b>Examiner</b>

<b>US Classification - Searched*</b>			
<b>Class</b>	<b>Subclass</b>	<b>Date</b>	<b>Examiner</b>

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

<b>Search Notes</b>		
<b>Search Notes</b>	<b>Date</b>	<b>Examiner</b>
EAST text and CPC searches. PE2E inventor search.	09/18/2019	JRH

<b>Interference Search</b>			
<b>US Class/CPC Symbol</b>	<b>US Subclass/CPC Group</b>	<b>Date</b>	<b>Examiner</b>

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**RECEIVED  
CENTRAL FAX CENTER****AUG 20 2018****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE****In Re Application of:****Kenneth M. Ponder****Serial No.: 15/989,655****Filed: May 25, 2018****Confirmation No.: 5897****Group Art Unit: 1761****Examiner: TBD****Docket No. 821920-1033****For: REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT****INFORMATION DISCLOSURE STATEMENT**

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

Sir:

This information disclosure statement is filed in accordance with 37 C.F.R. §§ 1.56, 1.97, and 1.98. Listed on the accompanying form SB-08(a) are documents which may or may not be considered material to the examination of this application. At least some of these documents were made of record in a prior application filed June 11, 2012 and having Serial No. 13/493,491, now U.S. Patent No. 9,982,179, issued May 29, 2018 to which priority is claimed relative to the present application pursuant to 35 U.S.C. §120. Copies of these documents are not being provided pursuant to 37 C.F.R. § 1.98(d)(1) and (2), which provides:

(d) A copy of any patent, publication, pending U.S. application or other information, as specified in paragraph (a) of this section, listed in an information disclosure statement is required to be provided, even if the patent, publication, pending U.S. application or other information was previously submitted to, or cited by, the Office in an earlier application, unless:

(1) The application is properly identified in the information disclosure statement and is relied on for an earlier effective filing date under 35 U.S.C. §120; and

(2) The information disclosure statement submitted in the earlier application complies with a paragraphs (a) through (c) of this section.

The following rights are reserved by the Applicant: the right to establish the patentability of the claimed invention over any of the listed documents should they be applied as reference, the right to prove that some of these documents may not be prior art, and/or the right to prove that some of these documents may not be enabling for the teachings they purport to offer.

This statement should not be construed as a representation that an exhaustive search has been made, or that information more material to the examination of the present application does not exist. The Examiner is specifically requested not to rely solely on the materials submitted herewith. The Examiner is requested to conduct an independent and thorough review of the documents, and to form independent opinions as to their significance.

It is respectfully requested that the Examiner initial and return a copy of the enclosed PTO-1449 to indicate the documents have been considered.

Respectfully submitted,

**THOMAS | HORSTEMEYER, LLP**

/Todd Deveau/

By:

Todd Deveau; Reg. No. 29,526

3200 Windy Hill Road, SE  
Suite 1600E  
Atlanta, GA 30339  
(770) 933-9500

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

**AUG 20 2018**

PTO/SB/08a (02-18)

Approved for use through 11/30/2020, OMB 0861-0031

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.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Not for submission under 37 CFR 1.99)	Application Number		15989655	
	Filing Date		2018-05-25	
	First Named Inventor	Kenneth M. Ponder		
	Art Unit	1761		
	Examiner Name	TBD		
	Attorney Docket Number	821920-1033		

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6207071	B1	2001-03-27	Takigawa et al.	
	2	9982179	B2	2018-05-29	Ponder et al.	
	3	8197706	B2	2012-06-12	Ponder et al.	

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

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1					

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FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup>	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							<input type="checkbox"/>

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

EFS Web 2.1.18

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If you wish to add additional Foreign Patent Document citation information please click the Add button			
<b>NON-PATENT LITERATURE DOCUMENTS</b>			
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 <sup>5</sup>
	1	List of refrigerants from Wikipedia, <a href="https://en.wikipedia.org/wiki/List_of_refrigerants">https://en.wikipedia.org/wiki/List_of_refrigerants</a> , last modified on 19 January 2017, 13 pages.	<input type="checkbox"/>
	2	Environmental Protection Agency (EPA), Air and Radiation Stratospheric Protection Division 6205J, "Substitute Refrigerants Under SNAP as of October 4, 2011", SNAP Information: <a href="http://www.epa.gov/ozone/snap">http://www.epa.gov/ozone/snap</a> , 18 pages.	<input type="checkbox"/>
	3	Summary of Substitute Refrigerants Listed in SNAP Notice 25, 10 pages.	<input type="checkbox"/>
	4	ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s, and u to ANSI/ASHRAE Standard 34-2004, "Designation and Safety Classification of Refrigerants", 2006 Supplement, ISSN 1041-2336, 35 pages.	<input type="checkbox"/>
If you wish to add additional non-patent literature document citation information please click the Add button			
<b>EXAMINER SIGNATURE</b>			
Examiner Signature	/JOHN R HARDEE/ (09/18/2019)		Date Considered 09/18/2019
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 809. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
<sup>1</sup> See Kind Codes of USPTO Patent Documents at <a href="http://www.USPTO.GOV">www.USPTO.GOV</a> or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

The PTO did not receive the following  
 listed item(s) 4 NPL

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	Examiner Name	TBD	
	Attorney Docket Number	821920-1033	

**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	/Todd Deveau/	Date (YYYY-MM-DD)	2018-08-20
Name/Print	Todd Deveau	Registration Number	29526

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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:11
S4	4678	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S5	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S6	4685	S4 S5	US-PGPUB; USPAT	OR	OFF	2017/12/04 12:14
S7	2057	"1,1,2,2-tetrafluoroethane"	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S8	4733	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S9	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S10	5584	S8 S9 S7	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:22
S11	7912	(r hfc) adj "125" r125 hfc125 pentafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S12	2057	"1,1,2,2-tetrafluoroethane"	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S13	4733	(r hfc) adj "134" r134 hfc134	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S14	9	"1" adj "1" adj "2" adj "2" adj tetrafluoroethane	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S15	5584	S13 S14 S12	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S16	1132	S11 near4 S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:24
S17	914	S11 near2 S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25
S18	617	S11 near S15	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25
S19	276	S18 AND ( (C09K5/045 OR C09K2205/22).CPC. )	US-PGPUB; USPAT	OR	OFF	2018/02/21 09:25

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

Application Number	15989655
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First Named Inventor	Kenneth M. Ponder
Art Unit	1761
Examiner Name	TBD
Attorney Docket Number	821920-1033

U.S.PATENTS						Remove
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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050082510	A1	2005-04-21	Ponder et al.	

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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2i</sup>	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	1377397	CN	A	2002-10-30	REFRIGERANT PRODUCTS LTD	(Copy of corresponding WO0123493 (A1))	×
	2	H08319479	JP	A	1996-12-03	DAIKIN IND LTD	(Abstract only)	☒
	3	1167133	CN	A	1997-12-10	MATSUSHITA ELECTRIC IND CO LTD	(Copy of corresponding EP0811670 (A1))	☒

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.R.H/

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**NON-PATENT LITERATURE DOCUMENTS**

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 <sup>5</sup>
	1	Translation of Notification of First Office Action for Chinese Application No. 201610187613X dated July 5, 2018 (821920-2053), 8 pages.	×

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**EXAMINER SIGNATURE**

Examiner Signature	/JOHN R HARDEE/ (09/18/2019)	Date Considered	09/18/2019
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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

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**OR**

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Signature	/Todd Deveau/	Date (YYYY-MM-DD)	2018-11-21
Name/Print	Todd Deveau	Registration Number	29526

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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## PUBLICATION NOTICE



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	First Named Inventor	Kenneth M. Ponder
	Art Unit	1761
	Examiner Name	TBD
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(54) Title: R 22 REPLACEMENT REFRIGERANT

(57) Abstract: A refrigerant composition comprising a hydrofluorocarbon component including 1,1,1,2-tetrafluoroethane (HCFC 134a), the composition further comprising an additive selected from a saturated hydrocarbon or mixture thereof boiling in the range -5 to +70 °C.

-1-

## R 22 REPLACEMENT REFRIGERANT

This invention relates to a refrigerant particularly but not exclusively for air conditioning systems. The system relates especially to refrigerant compositions which have no adverse effect on the atmospheric ozone layer and to compositions which can be added to existing refrigerants which are compatible with lubricants commonly used in refrigeration and air conditioning systems. The invention also relates to a method of modifying refrigeration and air conditioning systems.

Chlorofluorocarbons (CFCs) eg CFC 11 and CFC 12 are stable, of low toxicity and non-flammable providing low hazard working conditions used in refrigeration and air conditioning systems. When released they permeate into the stratosphere and attack the ozone layer which protects the environment from damaging effects of ultraviolet rays. The Montreal Protocol, an International environmental agreement signed by over 160 countries, mandates the phase-out of CFCs according to an agreed timetable. This now includes hydrochlorofluorocarbons (HCFCs) which also have an adverse effect on the ozone layer.

R 22 is a chemical fluid and by far the largest HCFC refrigerant used globally in refrigeration and air conditioning equipment. R 22 has an Ozone Depletion Potential (ODP) of approximately 5% of CFC 11. After CFCs have been phased out, the chlorine content of R 22 will make it the largest ozone depleting substance in volumetric terms. R 22 is also the subject of a phase-out schedule under the Montreal Protocol. R 22 is prohibited from use in new equipment in some countries.

Any replacement for HCFC 22 must have no ability to deplete ozone. The compositions of the present invention do not include chlorine atoms and consequently they will have no deleterious effect on the ozone layer while providing a similar performance as a working fluid to R 22 in refrigeration apparatus.

Various terms have been used in patent literature to describe refrigerant mixtures. These may be defined as follows:

**Zeotrope:** A fluid mixture whose vapour and liquid compositions are different at a specified temperature.

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**Temperature glide:** If a zeotropic liquid is distilled at constant pressure its boiling point will increase. The change in boiling point from the beginning of the distillation until the point when a liquid phase has just disappeared is called the temperature glide. A glide is also observed when the saturated vapour of a zeotrope is condensed at constant pressure.

**Azeotrope:** A fluid mixture of specified composition whose vapour and liquid compositions are the same at a specified temperature. Strictly speaking a fluid mixture which is an azeotrope under for example evaporator conditions, cannot also be an azeotrope under the condenser conditions. However the refrigeration literature may describe a mixture as azeotropic provided that it meets the above definition at some temperature within its working range.

**Near-azeotropes:** A blend which boils over a small temperature range, that has a small temperature glide.

**Retrofit refrigerant mixture:** A non-chlorine-containing mixture used to replace completely the original CFC or HCFC refrigerant.

**Extender refrigerant mixture:** A non-chlorine-containing mixture added during servicing to the HCFC refrigerant remaining in a unit, that is a top up refrigerant to make good any leakage.

**Hermetic compressor:** A compressor where the electric motor is in the same totally welded casing as the compressor. The motor is cooled by the refrigerant vapour returning to the compressor. The heat generated by the motor is removed through the condenser.

**Semi-hermetic compressor:** Similar to a hermetic compressor, the major difference being the casing has a bolted joint which can be opened to enable the motor and compressor to be serviced.

**Open compressor:** A compressor which is driven by an external motor via a drive shaft passing through the compressor casing. The motor heat is dissipated directly to the environment, not via the condenser. This results in a slightly more efficient performance than a hermetic compressor, but refrigerant leaks can occur at the shaft seal.

Percentages and proportions referred to in this specification are by weight unless indicated otherwise. Percentages and proportions are selected to total 100%. HFC and HCFC refrigerant compounds are referred to below by the letter R.

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According to a first aspect of the present invention a refrigerant composition comprises 1,1,1,2-tetrafluoroethane (R134a), pentafluoro ethane (R 125) and an additive selected from a saturated hydrocarbon or mixture thereof boiling in the range  $-5$  to  $+70^{\circ}\text{C}$ ; wherein the of weights of R 125 and R 134a are in the ranges:

R 125                      50 - 80%

R 134a                    50 - 20%

The compositions may be used as retrofit refrigerant mixtures. The composition may also be used as extenders as discussed below. The compositions may be used in semi-hermetic and hermetic systems.

The preferred weights of R125 to R 134a are in the ranges:

R 125                      60 - 80%

R 134a                    40 - 20%

A more preferred range is:

R 125                      60 - 78%

R 134a                    40 - 22%

A most preferred range is:

R 125                      64 - 76%

R 134a                    34 - 24%

These ranges are preferred for hermetic and semi-hermetic systems. The composition may also be used in an open system. The preferred weights in an open system are in the ranges:

R 125                      57 - 78%

R 134a                    43 - 22%.

A more preferred range is:

R 125                      63 - 76%

R 134a                    33 - 24%

The proportion of R 125 used in an open system may be up to 10%, preferably 4 to 5 % higher than in a hermetic or semi-hermetic system.

In a first aspect of this invention no other refrigerant may be included in the mixture. In a second aspect, suitable for use as an R 22 extender, an additional refrigerant R 32 may be added.

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Preferred hydrocarbons additives are selected from the group consisting of: 2-methylpropane, 2,2-dimethylpropane, butane, pentane, 2-methylbutane, cyclopentane, hexane, 2-methylpentane, 3-methylpentane, 2,2-dimethylbutane and methylcyclopentane. The hydrocarbon additive preferably has a boiling point in the range 20 to 40°C. Use of n-pentane, cyclopentane, iso-pentane and mixtures thereof is preferred. Use of n-pentane, isopentane or mixtures thereof is especially preferred. Commercially available saturated hydrocarbon mixtures are available from cyclopentane commercial grade from Phillips Petroleum International NV, Norpar<sup>P</sup>5 S n-pentane from Exxon Chemical and iso-pentane Q1111 from Shell Chemicals.

Relative proportions of the pentane and butane components may be selected to give a total of 0.2 to 5% of the compositions, preferably 2 to 4%, more preferably 3 to 4%. An amount of pentane, preferably isopentane of 0.2 to 2% may be used together with a corresponding amount of 4.8 to 3% of butane in a composition containing a total of 5% hydrocarbon. In compositions with less than 5% hydrocarbon, for example 1% or 4%, relatively larger ratios of butane : pentane may be employed to minimise hydrocarbon build-up on leakage. Flammability risks are therefore reduced.

According to a second aspect of the present invention a refrigerant extender mixture comprises a composition in accordance with the first aspect of this invention.

According to a third aspect of this invention a refrigerant composition comprises a composition in accordance with the first aspect of this invention together with R 22. This invention also provides a method of modifying a refrigerator or air conditioning system incorporating R 22 as refrigerant, the method comprising the step of adding a composition in accordance with the second aspect of this invention to the refrigerant of the system.

Positive displacement compressors, that is reciprocating or rotary compressors, used in refrigeration systems suck in small amounts of lubricant from the crank case which are ejected with the refrigerant vapour through the exhaust valves. In order to maintain compressor lubrication this oil must be forced around the circuit by the refrigerant stream and returned to the crank case. CFC and HCFC refrigerants are miscible with hydrocarbon oils and hence carry the oils around the circuit. However HFC refrigerants and hydrocarbon lubricants have low mutual solubilities so effective oil return may not occur. The problem is particularly acute in evaporators where low temperatures can increase the

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viscosities of oils sufficiently to prevent them being carried along the tube walls. With CFCs and HCFCs enough refrigerant remains in the oil to reduce the viscosities to enable oil return to occur.

When using HFCs with hydrocarbon lubricants oil return can be facilitated by introducing into the system a hydrocarbon fluid having the following properties:

- (a) sufficient solubility in the lubricant at the evaporator temperature to reduce its viscosity; and
- (b) sufficient volatility to allow distillation from the hot lubricant in the compressor crank case.

Hydrocarbons fulfil these requirements.

Refrigerant compositions in accordance with this invention confer several advantages. R 125 has fire suppressing characteristics. The presence of R125 suppresses the flammability of the refrigerant mixture. The higher HFC content enables more n-pentane to be added to the mixture thereby improving the solubility properties of the mixture with traditional lubricants, for example mineral and alkyl benzene oils.

The present invention may confer a number of benefits in comparison to R 22 including zero ozone depletion, lower discharge temperature, and higher capacity.

The present invention may confer a number of benefits in comparison to the HFC replacement R407C including superior hydrocarbon oil return, better motor cooling in hermetic compressors, lower discharge temperature and lower discharge pressure.

The invention is further described by means of examples but not in any limitative sense.

#### EXAMPLE 1

The performances of five R125/R134a/pentane compositions were evaluated using standard refrigeration cycle analysis techniques in order to assess their suitability as retrofit replacements for R22 in hermetic or semi-hermetic systems. The operating conditions, used for the analyses were chosen as being typical of those conditions that are found in air conditioning systems. Since the blends were zeotropes the midpoints of their temperature glides in the evaporator and condenser were chosen to define the temperature

-6-

limits of the cycle. The same temperatures were also used to generate performance data for R22.

The pentane was present at 4% by weight based on the total weight of the R125/R134a blend. To simplify the calculation this small amount of pentane was omitted.

The following refrigerant compositions were subjected to cycle analysis:

1. A composition comprising 44% R125: 56% R134a
2. A composition comprising 56% R125: 44% R134a
3. A composition comprising 64% R125: 36% R134a
4. A composition comprising 76% R125: 24% R134a
5. A composition comprising 80% R125: 20% R134a

The following cycle conditions were used in the analysis:

COOLING DUTY DELIVERED	10 kW
EVAPORATOR	
Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperature)	1.5 °C
CONDENSER	
Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °
Exhaust line pressure drop (in saturated temperature)	1.5 °C
LIQUID LINE/SUCTION LINE HEAT EXCHANGER	
Efficient	0.3



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**COMPRESSOR**

Electric motor efficiency	0.85
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82

**PARASITIC POWER**

Indoor fan	0.3 kW
Outdoor fan	0.4 kW
Controls	0.1 kW

The results of analysing the performances in an air-conditioning unit using these operating conditions are shown in Table 1. For comparison the performance of R22 is also shown.

All compositions have lower exhaust temperatures than R22 and are therefore superior on this account. However composition 5 is not preferred because the exhaust pressure is more than 2 bar above that of R22. Composition 1 is unacceptable because the refrigerant capacity is less than 90% of that of R22. The overall performances of compositions 2, 3 and 4 meet the criteria set out above and therefore satisfy the requirements of this invention.

**EXAMPLE 2**

The performances of five R125/R134a/pentane compositions were evaluated using standard refrigeration cycle analysis techniques in order to assess their suitability as retrofit replacements for R22 in open systems. The operating conditions, used for the analyses were chosen as being typical of those conditions that are found in air-conditioning systems. Since the blends were zeotropes the midpoints of their temperature glides in the evaporator and condenser were chosen to define the temperature limits of the cycle. The same temperatures were also used to generate performance data for R22.

The pentane was present at 4% by weight based on the total weight of the R125/R134a blend. To simplify the calculation this small amount of pentane was omitted.

The following refrigerant compositions were subjected to cycle analysis:

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1. A composition comprising 44% R125: 56% R134a
2. A composition comprising 56% R125: 44% R134a
3. A composition comprising 64% R125: 36% R134a
4. A composition comprising 76% R125: 24% R134a
5. A composition comprising 80% R125: 20% R134a

The following cycle conditions were used in the analysis:

COOLING DUTY	10 kW
EVAPORATOR	
Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperature)	1.5 °C
CONDENSER	
Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °C
Exhaust line pressure drop (in saturated temperature)	1.5 °C
LIQUID LINE/SUCTION LINE HEAT EXCHANGER	
Efficiency	0.3
COMPRESSOR	
Electric motor efficiency	0.85
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82
PARASITIC POWER	
Indoor fan	0.3 kW
Outdoor fan	0.4 kW
Controls	0.1 kW

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The results of analysing the performances in an air-conditioning unit using these operating conditions are shown in Table 2. For comparison the performance of R22 is also shown.

All compositions have lower exhaust temperatures than R22 and are therefore superior on this account. However composition 5 is unacceptable because its exhaust pressure is more than 2 bar above that of R22. Compositions 1 and 2 are unacceptable because their refrigerant capacities are less than 90% of that of R22. The overall performances of compositions 3 and 4 meet the criteria set out above and therefore satisfy the requirements of this invention.

### EXAMPLE 3

The performances of five R125/R134a/pentane compositions were evaluated using standard refrigeration cycle analysis techniques in order to assess their suitability as retrofit replacements for R22 in hermetic or semi-hermetic systems not fitted with a liquid line/suction line heat exchanger. The operating conditions, used for the analyses were chosen as being typical of those conditions that are found in air conditioning systems. Since the blends were zeotropes the midpoints of their temperature glides in the evaporator and condenser were chosen to define the temperature limits of the cycle. The same temperatures were also used to generate performance data for R22.

The pentane was present at 4% by weight based on the total weight of the R125/R134a blend. To simplify the calculation this small amount of pentane was omitted.

The following refrigerant compositions were subjected to cycle analysis:

1. A composition comprising 44% R125: 56% R134a
2. A composition comprising 56% R125: 44% R134a
3. A composition comprising 64% R125: 36% R134a
4. A composition comprising 76% R125: 24% R134a
5. A composition comprising 80% R125: 20% R134a

The following cycle conditions were used in the analysis:

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COOLING DUTY	10 kW
EVAPORATOR	
Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperate	1.5 °C
CONDENSER	
Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °C
Exhaust line pressure drop (in saturated temperature)	1.5 °C
COMPRESSOR	
Electric motor efficiency	0.85
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82
PARASITIC POWER	
Indoor fan	0.47 kW
Outdoor fan	0.26 kW
Controls	0.1 kW

The results from analysing the performances in an air-conditioning unit using these operating conditions are shown in Table 3. For comparison the performance of R22 is also shown.

All compositions have lower exhaust temperatures than R22 and are therefore superior on this account. However composition 5 is unacceptable because its exhaust pressure is more than 2 bar above that of R22. Compositions 1 and 2 are unacceptable because their refrigerant capacities are less than 90% of that of R22. The overall performances of compositions 3 and 4 meet the criteria set out above and therefore satisfy the requirements of this invention.

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EXAMPLE 4

The performances of two R125/R134a/pentane compositions were evaluated using standard refrigeration cycle analysis techniques in order to assess their suitability as extenders for R22 in hermetic or semi-hermetic systems. The operating conditions selected for the analyses are typical of those conditions found in air conditioning systems. Since the blends were zeotropes the midpoints of their temperature glides in the evaporator and condenser were chosen to define the temperature limits of the cycle and were also used to generate the performance of R22 for comparison.

The pentane was present at 4% by weight based on the total weight of the R125/R134a blend. To simplify the calculation this small amount of pentane was omitted.

The following R22 extender compositions were subjected to cycle analysis:

1. A composition comprising 64% R125: 36% R134a.
2. A composition comprising 44% R125: 56% R134a.

To establish the effects on unit performance resulting from successive dilutions of R22 by the above extenders the cycle was analysed for refrigerant compositions containing mass fractions of R22 from 1.0 down to 0.0. The results are summarised in Tables 4a and 4b. Key parameters are plotted in Chart 1 with the calculated points connected by smooth curves.

The following cycle conditions were used in the analysis:

COOLING DUTY	10 kW
EVAPORATOR	
Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperature)	1.5 °C

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**CONDENSER**

Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °C
Exhaust line pressure drop (in saturated temperature)	1.5 °C

**LIQUID LINE**

Electric motor efficiency	0.85
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82

**PARASITIC POWER**

Indoor fan	0.3 kW
Outdoor fan	0.4 kW
Controls	0.1 kW

All compositions have lower exhaust temperatures than R22 and are therefore superior on this account.

Composition 1 provides a cooling capacity greater than 90% of that of R22 over the whole of the dilution range. Blends containing more than 45% R22 have capacities equal to or better than that of R22. The COP (system) is within 2% of that of R22 over the whole of the dilution range. This composition therefore meets the requirements of this invention.

Composition 2 provides a cooling capacity greater than that 90% of R22 for blends containing down to 20% of R22. Its COP (system) is essentially the same as that of R22 over the whole of the dilution range. This composition therefore meets the requirements of this invention for blends containing down to 20% R22.

**EXAMPLE 5**

An R32/R134a/pentane composition was evaluated using standard refrigeration cycle analysis techniques to assess its suitability as an extender for R22 in hermetic or

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semi-hermetic systems. The operating conditions selected for the analysis are typical of those conditions found in air conditioning systems. Since the blend was a zeotrope the midpoints of its temperature glides in the evaporator and condenser were chosen to define the temperature limits of the cycle. The same temperatures were also used to generate performance data for R22.

The pentane was present at 4% by weight based on the total weight of the R32/R134a blend. To simplify the calculation this small amount of pentane was omitted.

The following R22 extender composition was subjected to cycle analysis:  
A composition comprising 44% R125 by weight, 56% by weight R134a.

To establish the effect on unit performance resulting from successive dilutions of R22 by topping up with the above extender the cycle was analysed for refrigerant compositions containing mass fractions of R22 from 1.0 down to 0.0. The results are shown in Table 5 and the results plotted out in Chart 2 with the calculated points connected by smooth curves.

The following cycle conditions were used in the analysis:

#### EVAPORATOR

Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperature)	1.5 °C

#### CONDENSER

Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °C
Exhaust line pressure drop (in saturated temperature)	1.5 °C

#### LIQUID LINE/SUCTION LINE HEAT EXCHANGER

Efficiency	0.3
------------	-----

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**COMPRESSOR**

Electric motor efficiency	0.85
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82

**PARASITIC POWER**

Indoor fan	0.3 kW
Outdoor fan	0.4 kW
Controls	0.1 kW

All blends containing the extender have lower exhaust temperatures than R22 and therefore meet the requirements of this specification. The COP (system) is essentially equal to that of R22 over the whole of the dilution range. The cooling capacity of the refrigerant is not less than 98% of that of R22 over the whole of the dilution range. For dilutions down to 20% of R22 the capacity is equal to or greater than that of R22. The exhaust pressure is less than the 0.5 bar above that of R22 over the whole of the dilution range.

The results of analysing the performance of an air-conditioning unit using these operating conditions are shown in Table 5.

R32/R134a 30/70 therefore meets the requirements of this invention.

**EXAMPLE 6**

An R32/R125/R134a/pentane composition was evaluated using standard refrigeration cycle analysis techniques program to assess its suitability as an extender for R22 in hermetic or semi-hermetic systems. The operating conditions selected for the analysis are typical of those conditions found in air conditioning systems. Since the blend was a zeotrope the midpoints of its temperature glides in the evaporator and condenser were chosen to define the temperature limits of the cycle. The same temperatures were also used to generate performance data for R22.



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The pentane was present at 4% by weight based on the total weight of the R32/R134a blend.

To simplify the calculation this small amount of pentane was omitted.

The following R22 extender composition was subjected to cycle analysis:

A composition comprising 23% by weight of R 32, 25%R125 by weight and 52% by weight R134a.

To establish the effect on unit performance resulting from successive dilutions of R22 by topping up with the above extender the cycle was analysed for refrigerant compositions containing mass fractions of R22 from 1.0 down to 0.0. The results are shown in Table 6 and the results plotted out in Chart 3 with the calculated points connected by smooth curves.

The following cycle conditions were used in the analysis:

#### EVAPORATOR

Midpoint fluid evaporation temperature	7.0 °C
Superheating	5.0 °C
Suction line pressure drop (in saturated temperature)	1.5 °C

#### CONDENSER

Midpoint fluid condensing temperature	45.0 °C
Subcooling	5.0 °C
Exhaust line pressure drop (in saturated temperature)	1.5 °C

#### LIQUID LINE/SUCTION LINE HEAT EXCHANGER

Efficiency	0.3
------------	-----

#### COMPRESSOR

Electric motor efficiency	0.8
Compressor isentropic efficiency	0.7
Compressor volumetric efficiency	0.82

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**PARASITIC POWER**

Indoor fan	0.3
Outdoor fan	0.4 kW
Controls	0.1 kW

The results of analysing the performance of an air-conditioning unit using these operating conditions are shown in Table 6.

All blends containing the extender have lower exhaust temperatures than R22 and therefore meet the requirements of this specification. The COP (system) is not less than 98% of that of R22 over the whole of the dilution range. The cooling capacity of the refrigerant is greater than of that of R22 over the whole of the dilution range. The exhaust pressure is less than the 2.0 bar above that of R22 over the whole of the dilution range.

R32/R134a in the ratio 30/70 therefore meets the requirements of this invention.

**EXAMPLE 7**

Refrigerant compositions comprising R 125, R 134a and hydrocarbon mixtures in commercial heat pump applications were assessed using a Comfort Aire model PHEC-60-1a 5 ton rooftop heat pump with a nominal cooling capacity of 56,000 btu and nominal heating capacity of 56,000 btu. An oil sight-glass was installed on the hermetic compressor and temperature sensors were installed on the suction and discharge lines and on the liquid line. Suction and discharge gauges were also installed.

The system was operated in both the cooling and heating mode with R 22 and the following data was recorded: voltage, amperage, suction pressure, suction temperature, discharge pressure, discharge temperature, liquid line temperature, evaporator temperature, ambient temperature, oil level and return supply air temperature. The R 22 charge was recovered and replaced successively with blends 1 to 6 of the following compositions.

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	R-125	R-134a	Pentane	Isopentane	Butane
Blend #1	64%	34%	2%		
Blend #2	70%	28%	2%		
Blend #3	55%	43%	2%		
Blend #4	60.5%	37.5%	2%		
Blend #5	45%	52%		1%	2%
Blend #6	55%	42%		1%	2%

It was observed that oil return was similar to R 22 operating levels with all of the blends employed, indicating that pentane and isopentane/butane additives provided proper oil return. Some blends required addition of up to 20% refrigerant to prevent icing of the evaporator. Capacities were found to vary with the composition employed. The energy consumption was generally lower with all blends. Discharge pressures were slightly higher on average with blends that exceeded 60.5% R 125 and lower with blends containing less than 60.5% R 125. The suction pressures and discharge temperatures were lower with all blends used. The superheat measured at the evaporator outlet was much higher than R 22 and the temperature difference across the evaporator was generally greater in the cooling mode and less in the heating mode. It was noted that pentane and isopentane/butane additives provided the necessary oil return. Blends #3, 5 and 6 provided the closest similarities to R 22 operational temperatures and pressures.

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## CLAIMS

1. A refrigerant composition comprising 1,1,1,2-tetrafluoroethane (R 134a), pentafluoroethane (R 125) and an additive selected from a saturated hydrocarbon or mixture thereof boiling in the range  $-5$  to  $+70^{\circ}\text{C}$ ; wherein the weights of R 125 to R 134a is in the ranges:

R 125	50 - 80%
R 134a	50 - 20%

2. A refrigerant composition as claimed in claim 1, wherein the weights are in the ranges:

R 125	60 - 80%
R134a	40 - 20%

3. A refrigerant composition as claimed in claim 2, wherein the weights are in the ranges:

R 125	60 - 78%
R 134a	40 - 22%

4. A refrigerant composition as claimed in claim 3, wherein the weights are in the ranges:

R 125	64 - 76%
R 134a	36 - 24%

5. A refrigerant composition as claimed in claim 1, wherein the weights are in the ranges:

R 125	57 - 78%
R 134a	43 - 22%

6. A refrigerant composition as claimed in claim 5, wherein the weights are in the ranges:

R 125	63 - 76%
R 134a	37 - 24%

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7. A refrigerant composition as claimed in any preceding claim, wherein the hydrocarbon additive is selected from the group consisting of 2-methylpropane, 2,2-dimethylpropane, butane, pentane, 2-methylbutane, cyclopentane, hexane, 2-methylpentane, 3-methylpentane, 2,2-dimethylbutane, methylcyclopentane and mixtures thereof.

8. A refrigerant composition as claimed in any preceding claim, wherein the hydrocarbon additive has a boiling point in the range of 20 to 40°C.

9. A refrigerant composition as claimed in claim 8, wherein the hydrocarbon additive is selected from: n-pentane, cyclopentane, iso-pentane and mixtures thereof.

10. A refrigerant composition as claimed in claim 9, wherein the hydrocarbon additive is n-pentane.

11. A refrigerant composition as claimed in claim 9 or 10, wherein the additive further comprises butane.

12. A refrigerant compositions as claimed in claim 11, wherein the ratio of pentane : butane is 1 : 3 to 1 : 8, preferably about 1 : 5.

13. A refrigerant composition as claimed in any preceding claim, wherein the amount of hydrocarbon additive is from a trace to 10%.

14. A refrigerant composition as claimed in claim 13, wherein the amount of hydrocarbon additive is 1 to 8%.

15. A refrigerant composition as claimed in claim 14, wherein the amount of hydrocarbon additive is 2 to 4%.

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16. A refrigerant composition as claimed in any of claims 1 to 15 together with a proportion of R 22.

17. A refrigerant extender mixture comprising a refrigerant composition as claimed in any preceding claim.

18. A method of modifying a refrigerator or air conditioning system which incorporates R 22 as refrigerant, the method comprising the step of adding a refrigerant extender as claimed in claim 17 to the refrigerant of the system.

19. Use of a refrigerant composition as an extender to R 22, wherein the hydrofluorocarbon component comprises R 32, R 125 and R 134a wherein the ratio of weights of R 32, R 125 and R 134a are in the ranges:

R 32	18 - 28%
R 125	20 - 30%
R 134a	42 - 62%

Table 1

Refrigerant % by weight	R-22	1. 125/134a 44/56	2. 125/134a 56/44	3. 125/134a 64/36	4. 125/134a 76/24	5. 125/134a 80/20
Discharge pressure (bar)	17.91	15.89	17.19	18.13	19.68	20.23
Discharge temperature (°C)	104.68	79.75	78.51	77.60	76.07	75.51
COP (system)	2.49	2.50	2.47	2.45	2.41	2.40
Capacity (kW/m <sup>3</sup> )	3066	2581	2747	2862	3041	3102
Glide in evaporator (°C)	0	3.06	3.17	3.03	2.47	2.19
Glide in condenser (°C)	0	2.97	2.94	2.71	2.09	1.81

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Table 2

Refrigerant % by weight	R-22	1. 125/134a 44/56	2. 125/134a 56/44	3. 125/134a 64/36	4. 125/134a 76/24	5. 125/134a 80/20
Discharge pressure (bar)	17.91	15.89	17.19	18.13	19.68	20.23
Discharge temperature (°C)	92.9	72.8	71.9	71.2	70.1	69.7
COP (system)	2.59	2.57	2.54	2.52	2.48	2.47
Capacity (kW/m <sup>3</sup> )	3222	2669	2838	2956	3138	3200
Glide in evaporator (°C)	0	3.06	3.17	3.03	2.47	2.19
Glide in condenser (°C)	0	2.97	2.94	2.71	2.09	1.81



Table 3

Refrigerant % by weight	R-22	1. 125/134a 44/56	2. 125/134a 56/44	3. 125/134a 64/36	4. 125/134a 76/24	5. 125/134a 80/20
Discharge pressure (bar)	17.91	15.89	17.19	18.13	19.68	20.23
Discharge temperature (°C)	94.63	71.81	70.63	69.71	68.082	67.47
COP (system)	2.45	2.42	2.39	2.37	2.33	2.36
Capacity (kW/m <sup>3</sup> )	3077	2535	2692	2800	2965	3021
Glide in evaporator (°C)	0	2.88	2.99	2.87	2.34	2.07
Glide in condenser (°C)	0	2.97	2.94	2.71	2.09	1.81

Table 4a R125/R134a 64%/36% as Extender for R22

Refrigerant % R22 by weight	0	10	20	30	40	50	60	70	80	90	100
Discharge pressure (bar)	18.13	18.47	18.69	18.81	18.84	18.80	18.70	18.56	18.37	18.15	17.91
Discharge temperature (°C)	77.6	79.7	81.8	84.0	86.4	89.0	91.7	94.6	97.8	101.1	104.7
COP (system)	2.45	2.45	2.46	2.46	2.47	2.47	2.48	2.48	2.49	2.49	2.49
Capacity (kW/m <sup>3</sup> )	2862	2937	2996	3042	3074	3096	3107	3108	3101	3087	3069
Glide in evaporator (°C)	3.03	2.91	2.66	2.36	2.04	1.73	1.41	1.08	0.75	0.39	0
Glide in condenser (°C)	2.71	2.55	2.31	2.06	1.80	1.54	1.28	1.09	0.71	0.38	0

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Table 4b R125/R134a 44%/56% as Extender for R22

Refrigerant % R22 by weight	0	10	20	30	40	50	60	70	80	90	100
Discharge pressure (bar)	15.90	16.41	16.83	17.17	17.44	17.64	17.79	17.88	17.93	17.93	17.91
Discharge temperature (°C)	79.6	81.7	83.7	85.8	88.0	90.3	92.8	95.5	98.3	101.4	104.7
COP (system)	2.50	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Capacity (kW/m <sup>3</sup> )	2581	2675	2756	2825	2885	2935	2977	3010	3036	3054	3066
Glide in evaporator (°C)	3.06	3.08	2.91	2.62	2.27	1.89	1.50	1.12	0.74	0.37	0
Glide in condenser (°C)	2.97	2.89	2.66	2.36	2.02	1.69	1.34	1.00	0.67	0.34	0

Table 5 R32/134a 30/70 as an Extender for R22

Refrigerant % R22 by weight	0	10	20	30	40	50	60	70	80	90	100
Discharge pressure (bar)	18.08	18.18	18.27	18.33	18.36	18.36	18.34	18.28	18.19	18.07	17.91
Discharge temperature (°C)	98.0	98.4	98.9	99.3	99.8	100.4	101.0	101.8	102.6	103.6	104.7
COP (system)	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Capacity (kW/m <sup>3</sup> )	3030	3049	3066	3080	3091	3098	3101	3100	3094	3083	3066
Glide in evaporator (°C)	5.03	4.59	4.12	3.62	3.11	2.59	2.07	1.55	1.03	0.51	0
Glide in condenser (°C)	5.13	4.62	4.11	3.60	3.08	2.57	2.07	1.56	1.06	0.54	0

Table 6 R32/125/134a 23/25/52 as an Extender for R22

Refrigerant % R22 by weight	0	10	20	30	40	50	60	70	80	90	100
Discharge pressure (bar)	19.30	19.32	19.30	19.25	19.16	19.03	18.87	18.68	18.45	18.20	17.91
Discharge temperature (°C)	92.5	93.3	94.1	95.0	96.0	97.1	98.4	99.7	101.2	102.9	104.7
COP (system)	2.47	2.47	2.47	2.47	2.47	2.48	2.48	2.48	2.49	2.49	2.49
Capacity (kW/m <sup>3</sup> )	3172	3183	3190	3193	3191	3183	3171	3157	3129	3101	3066
Glide in evaporator (°C)	4.8	4.4	3.9	3.4	2.9	2.4	1.9	1.5	1.0	0.5	0
Glide in condenser (°C)	4.7	4.2	3.8	3.3	2.8	2.4	1.9	1.5	1.0	0.5	0

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TABLE 7

## COMMERCIAL ROOF TOP HEAT PUMP 5 TON

	R-22	BLEND 1	BLEND 3	BLEND 4	BLEND 5	BLEND 6	BLEND 7
WT% COMPOSITION		64/34/2	70/28/2	55/43/2	60.5/37.5/2	45/52/1/2	55/42/1/2
<b>COOLING MODE</b>							
ADDITIONAL REFR. REQ'D		.9 KG	.9 KG	NONE	.9 KG	NONE	NONE
SUCTION PRESSURE	4.48	3.5	3.37	3.03	3.45	2.69	3.1
SUCTION TEMPERATURE	18	22	19.4	27	20	22	21.7
DISCHARGE PRESSURE	13.1	13.5	13.17	12.68	12.42	11.25	12.42
DISCHARGE TEMP.	90	80	73	81	72	76	76
LIQ. LINE TEMP.	31	29	26	32	26	26	26
AMBIENT TEMPERATURE	22	24	21.7	26	21.2	22	22
OIL LEVEL	10.8CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM
AMPERAGE	22.27	19.86	19.64	17.72	19.06	16.13	17.83
VOLTAGE	200	201	199	200	199	203	200
EVAPORATOR TEMP.	7.2	3.9	2.2	4	5	1.7	2.3
AIR TEMP. DIFFERENCE	12.2	17.7	16.1	19.7	14.4	17.3	16.1
SUPERHEAT	9.1	21	19.4	28	20	26	23.3
<b>HEATING MODE</b>							
SUCTION PRESSURE	4.82	4.97	4.9	3.6	4.69	3.45	3.72
SUCTION TEMP.	25	23	23	26	22	23	22
DISCHARGE PRESSURE	20.34	25.5	25.6	19.3	24	17.94	19.3
DISCHARGE TEMP.	120	98	98	95	94	91	91
LIQ. LINE TEMP.	32.2	30	30	32	29	27	26
AMBIENT TEMP.	24.2	24	22.2	25	22.4	22	20
OIL LEVEL	10.8CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM	10.8 CM
AMPERAGE	28.97	28.08	27.63	21.9	26.72	20.77	22.54
VOLTAGE	198	199	198	199	198	203	199
EVAPORATOR TEMP.	41	36.2	36.1	36.1	34	32	31
AIR TEMP. DIFFERENCE	11.1	7.8	7.8	6.3	7.6	7.2	7.5
SUPERHEAT	NA	NA	NA	NA	NA	NA	NA

PRESSURES ARE IN BARS GAUGE PRESSURE

TEMPERATURES ARE IN CELSIUS

ALL READINGS ARE AVERAGES OVER SEVERAL HOURS OF OPERATION

OIL LEVEL MEASURED IN CENTIMETRES

SUBSTITUTE SHEET (RULE 26)

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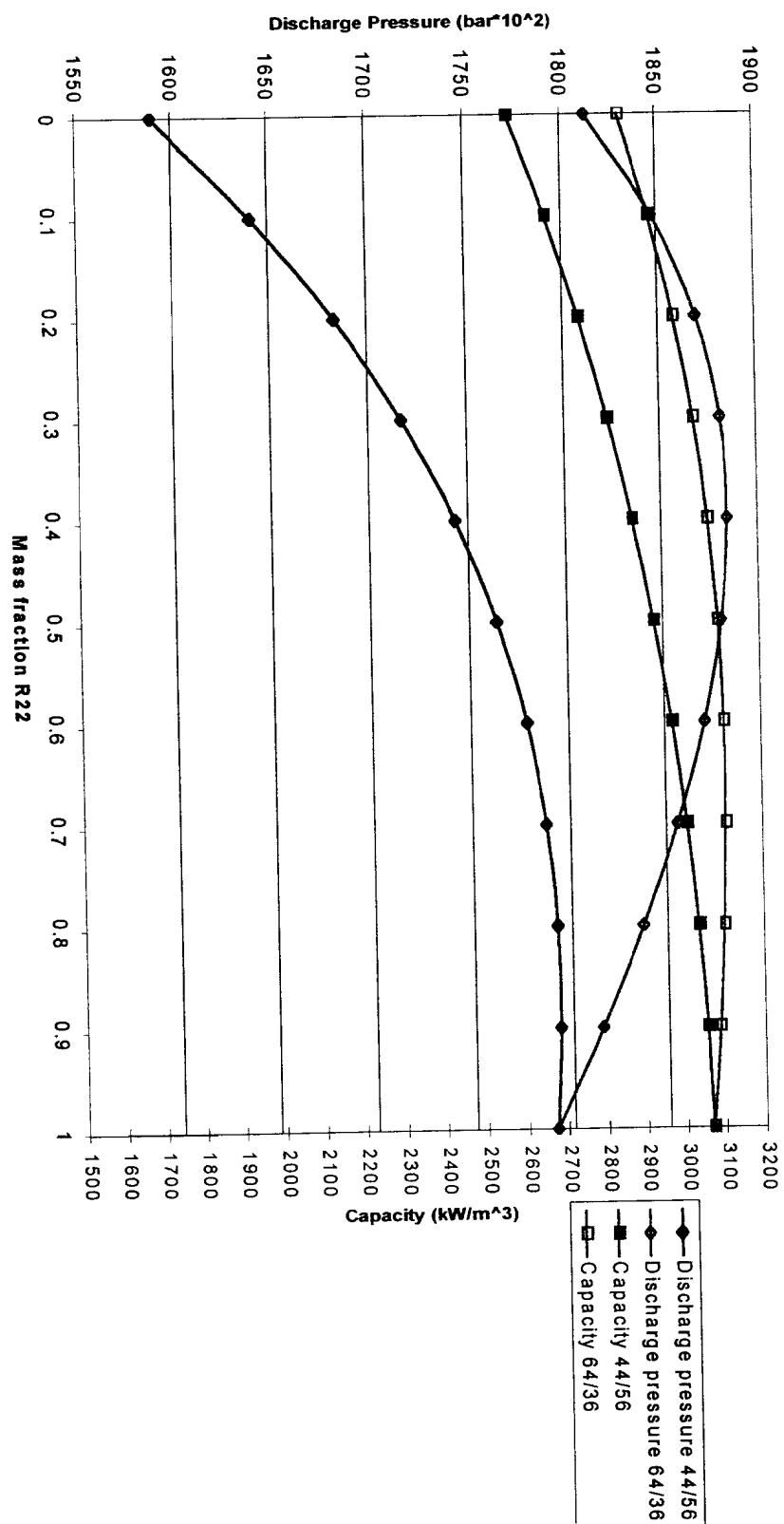
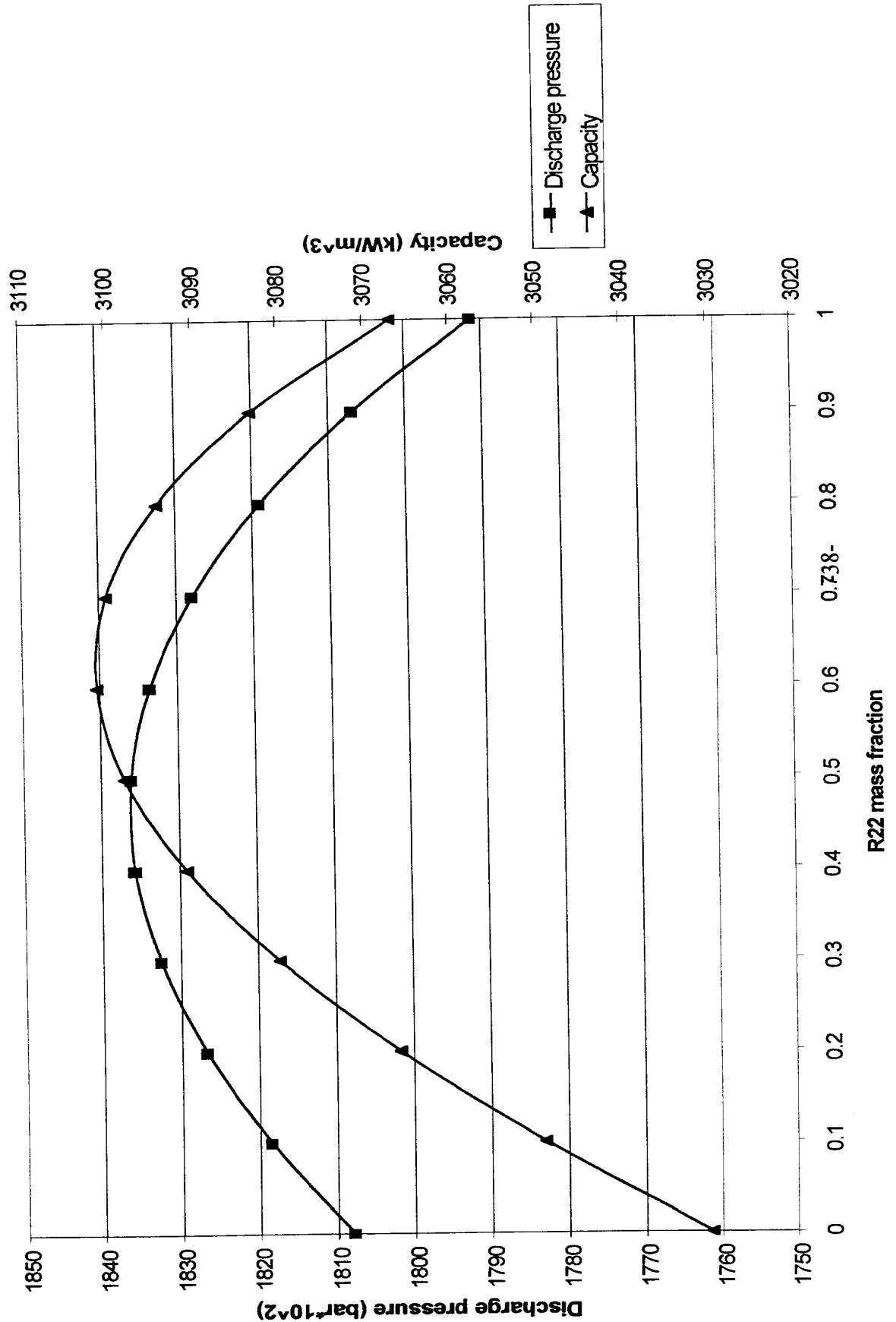
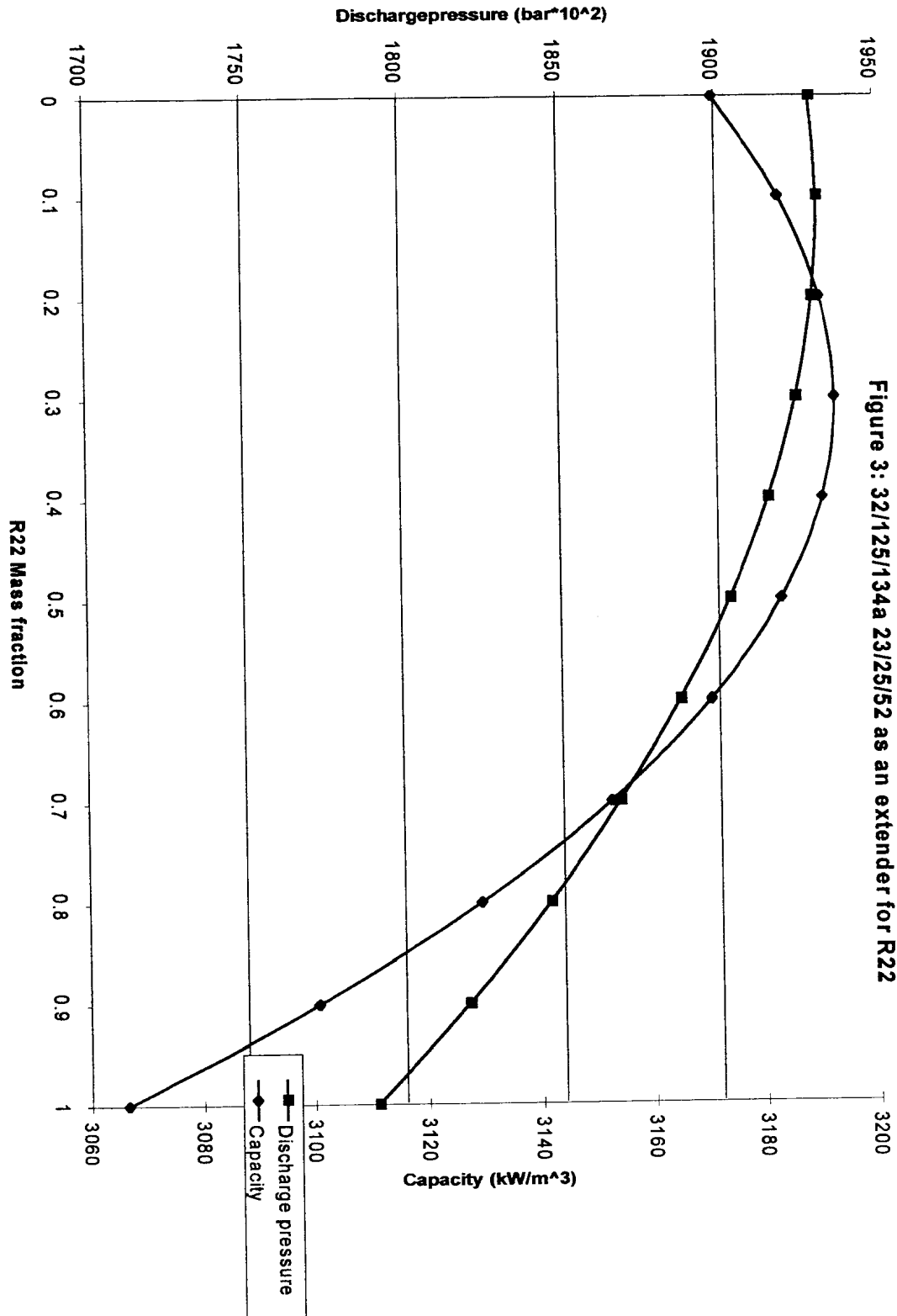


Figure 2: R32(30)/R134a(70) as an extender for R22







# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03725

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C09K5/04

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)

IPC 7 C09K

Documentation 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, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 00 56834 A (DU PONT) 28 September 2000 (2000-09-28)  page 3, line 32 -page 4, line 1; tables 3,4	1-3, 5-10,13, 14,19
A	EP 0 539 952 A (MATSUSHITA ELECTRIC IND CO LTD) 5 May 1993 (1993-05-05) table 3	1-19
A	EP 0 811 670 A (MATSUSHITA ELECTRIC IND CO LTD) 10 December 1997 (1997-12-10) abstract	1-19
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category "	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE ELDATA 'Online!  Gesellschaft für wissenschaft-technische  Information mbH;  Refrigerant R407C, 1998  S. BENMANSOUR ET AL: "Vapor-liquid  equilibria and densities of  difluoromethane (R 32, 23 wt. %) +  pentafluoroethane (R 125, 25 wt. %) +  1,1,1,2-tetrafluoroethane (R 134a, 52 wt.  %) mixture (R 407C) at temperatures  between 253 K and 333 K and pressures up  to 20 MPa (11600 data points)"  retrieved from  HTTP://WWW.FIZ-KARLSRUHE.DE/ELDATA/PROPCLA  SS/BENS2980.HTM  XP002154412  abstract</p>	19
A	<p>-----</p> <p>DATABASE WPI  Section Ch, Week 199436  Derwent Publications Ltd., London, GB;  Class E16, AN 1994-291153  XP002154424  &amp; JP 06 220430 A (SANYO ELECTRIC CO LTD),  9 August 1994 (1994-08-09)  abstract</p>	1-19
A	<p>-----</p> <p>EP 0 879 866 A (DAIKIN IND LTD)  25 November 1998 (1998-11-25)  abstract</p> <p>-----</p>	17,18

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0056834	A	28-09-2000	NONE	
EP 0539952	A	05-05-1993	JP 2568774 B JP 5117643 A DE 69207346 D DE 69207346 T	08-01-1997 14-05-1993 15-02-1996 08-08-1996
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Espacenet

## Bibliographic data: JPH08319479 (A) — 1996-12-03

### REFRIGERANT

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**Classification:** - **international:** **C07C19/08; C09K5/04; F25B1/00;**  
(IPC1-7): C07C19/08; C09K5/04; F25B1/00  
- **cooperative:**

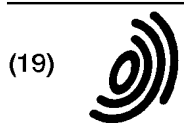
**Application number:** JP19950325342 19951214

**Priority number (s):** JP19950325342 19951214

**Also published as:** JP2867932 (B2)

### Abstract of JPH08319479 (A)

PURPOSE: To obtain refrigerants free from the possibility of causing ozonosphere depletion and excellent in refrigerating performance, especially coefficient of performance. CONSTITUTION: A refrigerant consisting of HCFC-125 and HFC-134a, of which HCFC-125 accounts for more than 40wt.% to less than 90wt.% and HFC-134a accounts for more than 10wt.% to less than 60wt.%, or of which HCFC-125 accounts for more than 90wt.% to less than 100wt.% and HFC-134a accounts for more than 0wt.% to less than 10wt.%. A refrigerant consisting of HCFC-125 and HFC-134, of which HCFC-125 accounts for more than 40wt.% to less than 90wt.% and HFC-134 accounts for more than 10wt.% to less than 60wt.%, or of which HCFC-125 accounts for more than 90wt.% to less than 100wt.% and HFC-134 accounts for more than 0wt.% to less than 10wt.%.



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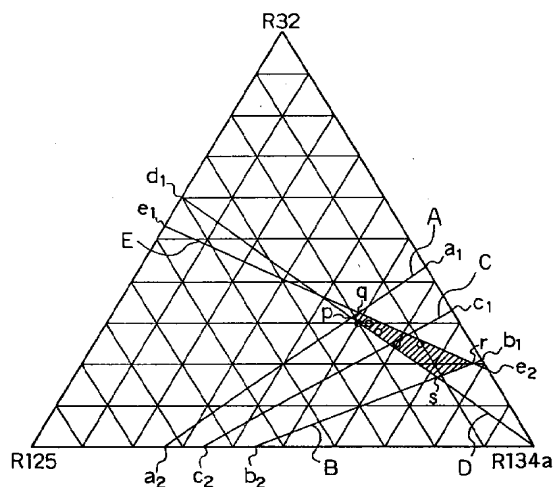
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(54) Ternary mixture refrigerant and heat pump apparatus utilizing the same

(57) A ternary mixture refrigerant having a high efficiency which can be used as a substitute for R22 and a heat pump apparatus utilizing the same are disclosed. The ternary mixture refrigerant is in a composition range defined by a straight line A which connects a point  $a_1$  (R32/R134a = 43/57 wt%) and a point  $a_2$  (R125/R134a = 73/27 wt%), a line B which connects a point  $b_1$  (R32/R134a = 21/79 wt%) and a point  $b_2$  (R125/R134a = 55/45 wt%), a line D which connects a point  $d_1$  (R32/R125 = 60/40 wt%) and a vertex of R134a, and a line E which connects a point  $e_1$  (R32/R125 = 53/47 wt%) and a point  $e_2$  (R32/R134a = 19/81 wt%) in a ternary composition diagram of R32, R125 and R134a represented by a triangular coordinate in FIG. 1.

FIG. 1



EP 0 811 670 A1

## Description

## BACKGROUND OF THE INVENTION

5 The present invention relates to a ternary mixture refrigerant which can be used as a substitute for chlorodifluoromethane and a heat pump apparatus utilizing the same.

Conventional heat pump apparatuses in air conditioners, freezers, refrigerators and the like comprise a power refrigerating cycle formed by connecting a compressor, a condenser, a squeezing device such as capillary tube, expansion valve or the like, and an evaporator or the like together through pipe lines, and perform a cooling operation or a heating operation by circulating a refrigerant or working fluid through the connected components and pipe lines. The above-mentioned refrigerating cycle may include a four-way valve or cock. In these heat pump apparatuses, halogenated hydrocarbons derived from methane or ethane (hereinafter referred to as R-- or R---, as stipulated in the U.S. ASHRAE 34 Standard of the United States) are usually used as their refrigerants or working fluids. Among them, chlorodifluoromethane ( $\text{CHClF}_2$ , R22, b.p.  $-40.8^\circ\text{C}$ ) has been widely used as a refrigerant in a refrigerating system such as air conditioner, freezer, refrigerator and the like.

However, depletion of the ozone layer in the stratosphere with chlorofluorohydrocarbons is seriously discussed as one of the global environmental problems in recent years, and the usage and volume of production of some chlorofluorohydrocarbons which have high ozone depletion potential are limited by the Montreal Protocol. In future, their use and production will be completely banned. In order to substantially obviate the influence on the ozone layer in the stratosphere, it is an essential requirement for the refrigerant to contain no chlorine atom in its molecular structure. As one having a possibility of obviating the influence on the ozone layer in the stratosphere, fluorohydrocarbons containing no chlorine (HFCs) are proposed. Fluorohydrocarbons containing no chlorine may be exemplified as difluoromethane ( $\text{CH}_2\text{F}_2$ , R32, b.p.  $-52^\circ\text{C}$ ), pentafluoroethane ( $\text{CF}_3\text{-CHF}_2$ , R125, b.p.  $-48^\circ\text{C}$ ), 1,1,1-trifluoroethane ( $\text{CF}_3\text{-CH}_3$ , R143a, b.p.  $-48^\circ\text{C}$ ), 1,1,1,2-tetrafluoroethane ( $\text{CF}_3\text{-CH}_2\text{F}$ , R134a, b.p.  $-27^\circ\text{C}$ ), 1,1-difluoroethane ( $\text{CHF}_2\text{-CH}_3$ , R152a, b.p.  $-25^\circ\text{C}$ ), and the like.

In addition to this problem, the refrigerants of fluorohydrocarbons have another serious environmental problem of global warming and are regarded as having global warming potential (hereinafter referred to as "GWP") indicating the influence on the global warming of the same degree as R22. According to the report on IPCC (Intergovernmental Panel on Climate Change) in 1994 which defines the GWP of carbon dioxide ( $\text{CO}_2$ ) as 1, it is estimated that relative values of GWP of R22 are 4300, 1700 and 520 for 20 years, 100 years, and 500 years, respectively; and with the fluorinated hydrocarbons containing no chlorine, the corresponding relative values for R32 are 1800, 580 and 180; the corresponding relative values for R125 are 4800, 3200 and 1100; the corresponding relative values for R143a are 5200, 4400 and 1600; the corresponding relative values for R134a are 3300, 1300 and 420; and the corresponding relative values for R152a are 460, 140 and 44, respectively.

Among the fluorinated hydrocarbons containing no chlorine, R32, R125 and R143a have a lower boiling point than that of R22 and thus raise the condensing pressure in the heat pump apparatus very high, and thus it is difficult to use them singly as a substitute for R22. Since R134a and R152a have a higher boiling point than that of R22 and lower the refrigerating capacity of the heat pump apparatus, it is also difficult to use them singly as a substitute for R22. In addition, R32, R143a and R152a have a disadvantage that they are flammable.

In order to overcome the disadvantage, a binary mixture refrigerant comprising R32/R125 or a ternary mixture refrigerant comprising R32/R125/R134a has been proposed as a promising substitute for R22. U.S. Patent No. 4,978,467 discloses that the binary mixture refrigerant comprising R32/R125 acts as an azeotropic mixture refrigerant. Since the disclosed mixture refrigerant has a high vapor pressure, it is difficult to apply the refrigerant as it is to the heat pump apparatus which has been operated with R22.

For this reason, the ternary mixture refrigerant comprising R32/R125/R134a which has a vapor pressure of the same degree as that of R22 is disclosed in U.S. Patent No. 5,370,811, U.S. Patent No. 5,185,094, EP A 451,692 and EP A 509,673 as a promising refrigerant. In addition, a composition of R32/R125/R134a of 23/25/52 wt% is proposed [Request for Refrigerant Safety Classification and Nomenclature for Zeotropic Ternary Refrigerant Mixture: HFC-32/HFC-125/HFC-134a, by E.I. du Pont de Nemours and Company, Wilmington, Del., U.S.A., applied on May 18, 1994]. The composition of R32/R125/R134a of 23/25/52 wt% is numbered R407C in the U.S. ASHRAE 34 Standard.

The above-mentioned ternary mixture refrigerant is however a non-azeotropic mixture refrigerant and its boiling point differs from its dew point. In addition, the refrigerant shows a temperature gradient in the condenser or the evaporator. Namely, the temperature of the mixture refrigerant lowers by its temperature gradient as the refrigerant is condensed in the condenser and the temperature of the refrigerant rises by its temperature gradient as it is evaporated in the evaporator. Therefore, low boiling point components such as R32 and R125 are liable to be concentrated in the vapor phase whereas a high boiling point component such as R134a in the liquid phase. In addition, since the mixture refrigerant is prepared by blending a plurality of components, it is necessary to specify an error in the proportion of the respective components as a definite composition error. For that reason, a further research will be required for clarifying what composition will give a suitable refrigerant for the heat pump apparatus.

Summaries of the prior art literature which disclose the above-mentioned ternary mixture refrigerant are as follows.

U.S. Patent No. 5,370,811 which is a senior application by some of the inventors of the present invention specifies a composition range of the ternary mixture refrigerant comprising R32/R125/R134s wherein the mixture can demonstrate a substantially equal vapor pressure to that of R22.

U.S. Patent No. 5,185,094 discloses characteristics of the refrigerant in terms of coefficient of performance and refrigerating capacity obtained by using this ternary mixture refrigerant for a heat pump apparatus, and a change in the composition resulting from repeated leakages as a non-azeotropic mixture refrigerant.

EP A 451,692 discloses in Example 3 a general tendency of the coefficient of performance and refrigerating capacity during the application of this ternary mixture refrigerant to a heat pump apparatus, and outlines the nonflammable range of the composition.

Similarly, EP A 509,673 discloses some examples of the coefficient of performance and refrigerating capacity during the application of this ternary mixture refrigerant to a heat pump apparatus. In addition, in Attachment 2, Exhibit 7 of the above-mentioned Request by E.I. du Pont, there is disclosed a most recently published nonflammable range of this R32/R125/R134a.

Based on the above disclosures of the prior art literature, although it is possible to analogize a suitable composition range of this R32/R125/R134a, it is not clarified which composition is actually preferable as the refrigerant of the heat pump apparatus.

In addition, relative values of GWP of the promising composition of R32/R125/R134a of 23/25/52 wt% (R407C), calculated by defining the GWP of carbon dioxide (CO<sub>2</sub>) as 1, are estimated to be 3300, 1600 and 530, for 20 years, 100 years and 500 years, respectively. The values are smaller than those of R22 as GWPs for 20 years and 100 years but have a possibility of becoming larger than that of R22 if compared for a long span of 500 years. From this point of view, it is desired to propose a more promising new composition.

#### BRIEF SUMMARY OF THE INVENTION

The present invention proposes a further restricted composition range of a ternary mixture refrigerant comprising R32/R125/R134a on the basis of a detailed experimental study using a heat pump apparatus which utilizes air as its heat source and various investigations based on the most recently published nonflammable range of R32/R125/R134a.

The object of the present invention is to provide a ternary mixture refrigerant which is more suitable for a working fluid for the heat pump apparatus and has substantially equal refrigerating capacity and higher coefficient of performance compared with the promising composition of 23/25/52 wt% (R407C).

Another object of the present invention is to provide a ternary mixture refrigerant which is nonflammable even in the vapor phase composition in addition to the liquid phase composition and has lower GWP compared with R407C.

The mixture refrigerant in accordance with the present invention comprising R32/R125/R134a is in a composition range defined by a straight line A which connects a point a<sub>1</sub> (R32/R134a = 43/57 wt%) and a point a<sub>2</sub> (R125/R134a = 73/27 wt%), a line B which connects a point b<sub>1</sub> (R32/R134a = 21/79 wt%) and a point b<sub>2</sub> (R125/R134a = 55/45 wt%), a line D which connects a point d<sub>1</sub> (R32/R125 = 60/40 wt%) and a vertex of R134a, and a line E which connects a point e<sub>1</sub> (R32/R125 = 53/47 wt%) and a point e<sub>2</sub> (R32/R134a = 19/81 wt%) in a ternary composition diagram represented by a triangular coordinate in FIG. 1.

In the triangular coordinate, which is depicted by disposing R32, R125 and R134a at the respective vertexes of a triangle in the counterclockwise direction from the top vertex, single components are assigned on the vertexes from a compound having the lowest boiling point to one having the highest boiling point. A composition (ratio by weight) of the three compounds at one point on the triangular coordinate is expressed by a ratio of distances between the point and the opposite sides. The distance between the point and the opposite side corresponds to a proportion of the compound which is assigned on the vertex which faces the side.

While the novel features of the invention are set forth particularly in the appended claims, the invention, both as to organization and content, will be better understood and appreciated, along with other objects and features thereof, from the following detailed description taken in conjunction with the drawings.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is a composition diagram represented by a triangular coordinate for describing the composition of the ternary mixture refrigerant comprising R32/R125/R134a in accordance with the present invention.

FIG. 2 is a diagram showing a relationship between percent by weight of R32 in a binary mixture refrigerant comprising R32/R125 and saturation temperature gradient.

FIG. 3 is a schematic diagram showing the refrigerating cycle in the heat pump apparatus which utilizes the mixture refrigerant in accordance with the present invention.

FIG. 4 is a composition diagram represented by a triangular coordinate for describing the nonflammable region of the ternary mixture refrigerant comprising R32/R125/R134a in accordance with the present invention.



## DETAILED DESCRIPTION OF THE INVENTION

The ternary mixture refrigerant in accordance with the present invention is in the composition range defined by lines A, B, D and E, namely a hatched area of a quadrilateral formed by connecting vertexes of points p, q, r and s, in the ternary composition diagram represented by the triangular coordinate in FIG. 1. The points p and q are the intersecting points at which the line A intersects the lines D and E, respectively, and the points r and s are the intersecting points at which the line B intersects the lines E and D, respectively. In FIG. 1, the compositions of the five specific examples of the mixture refrigerant in accordance with the present invention, namely, the mixture refrigerants Nos. 4, 3, 2, 9 and 10 in the specific examples which will be described below are indicated by white circles in turn from the left side of the diagram.

The heat pump apparatus in accordance with the present invention has a power refrigerating cycle which utilizes the above-mentioned ternary mixture refrigerant as a working fluid. In particular, a refrigerating cycle comprising a compressor driven by an inverter unit is suitable.

Of the mixture refrigerant of R32/R125/R134a, compositions in a region between the line A and the line B have a vapor pressure which is substantially equal to that of R22 and thus have substantially equal refrigerating capacity. Compositions containing R32 in a larger quantity than those on the line D have a higher coefficient of performance than that of the composition of R32/R125/R134a = 23/25/52 wt% (R407C). In compositions containing R32 in a smaller quantity than those on the line E, it is believed that not only a liquid phase composition but also its equilibrium vapor phase composition are nonflammable even if the composition at room temperature is placed in an atmospheric temperature at 100°C. In addition, since the mixture refrigerants of R32/R125/R134a in this composition range contain a smaller proportion of R125 which has a high GWP as compared with R407C, it is possible to lower their GWPs.

Among the compositions in the quadrilateral formed by connecting the vertexes of the above-mentioned points p, q, r and s, compositions in the region between a line C connecting a point  $c_1$  (R32/R134a = 33/67 wt%) and a point  $c_2$  (R125/R134a = 65/35 wt%) and the line A have larger refrigerating capacity than that of R407C, and thus are preferable for improving the coefficient of performance in the heat pump apparatus comprising a compressor driven by an inverter unit in both the cooling mode and heating mode operations. This ambi-utility heat pump apparatus is preferably used in a household air conditioner or the like.

In addition, among the compositions in the quadrilateral formed by connecting the vertexes of the above-mentioned points p, q, r and s, although compositions in the region between the line C and the line B have substantially the same as or smaller refrigerating capacity than that of R407C, the compositions are preferable for improving the coefficient of performance in the heat pump apparatus mainly for the cooling mode operation. This heat pump apparatus is used in a commercial air-conditioner, an automatic vendor or the like.

Further, mixture refrigerants having a composition of R32/R125/R134a of about 25/10/65 wt% or about 25/15/60 wt% can lower the condensing pressure. These compositions are suitable for such a heat pump apparatus in which refrigerating cycle is designed to work under a mode of counter flow heat transfer in cooling mode operation.

In the following paragraphs, specific examples of the present invention will be described.

## EXAMPLE 1

Table 1 and Table 2 below show ideal refrigerating capacity of some specific examples of mixture refrigerants comprising R32/R125/R134a in accordance with the present invention together with those of mixture refrigerants of some comparative examples. The performance was measured under conditions of an average condensing temperature of 50°C, an average evaporating temperature of 0°C, a degree of supercool of 0 deg at an outlet of the condenser and a degree of superheat of 0 deg at an outlet of the evaporator. The refrigerants Nos. 2, 3, 4, 9 and 10 are specific examples of the present invention and the other refrigerants are comparative examples.

Table 1

Refrigerant No.		1	2	3	4	5
Composition (wt%)	R32	23	28	30	30	33
	R125	25	17	18	20	17
	R134a	52	55	52	50	50
Refrigerating capacity (Ratio to R407C)		1.000	1.031	1.059	1.065	1.090
Coefficient of performance (Ratio to R407C)		1.000	1.012	1.010	1.007	1.013
Condensing pressure (MPa)		2.091	2.108	2.161	2.185	2.212
Evaporating pressure (MPa)		0.495	0.498	0.513	0.520	0.528
Discharge temperature (°C)		67.29	69.81	70.57	70.39	71.70
Condensing temperature gradient (deg)		4.74	4.94	4.86	4.78	4.80
Evaporating temperature gradient (deg)		4.24	4.43	4.44	4.40	4.45

As listed in Table 1 above, the refrigerants No. 2 through No.5 have slightly higher condensing pressure, evaporating pressure and discharge temperature, compared with those of R 407C (R32/R125/R134a = 23/25/52 wt%), because the proportion of R32 having a higher vapor pressure than that of R22 is large, but both their refrigerating capacity and coefficient of performance are more favorable than those of R407C.

Table 2

Refrigerant No.		6	7	8	9	10
Composition (wt%)	R32	30	30	25	25	25
	R125	0	10	20	15	10
	R134a	70	60	55	60	65
Refrigerating capacity (Ratio to R407C)		0.989	1.027	1.006	0.987	0.969
Coefficient of performance (Ratio to R407C)		1.045	1.029	1.008	1.022	1.028
Condensing pressure (MPa)		1.965	2.071	2.077	2.022	1.968
Evaporating pressure (MPa)		0.455	0.486	0.490	0.473	0.457
Discharge temperature (°C)		71.30	70.84	68.39	68.51	68.80
Condensing temperature gradient (deg)		5.22	5.10	4.88	5.00	5.08
Evaporating temperature gradient (deg)		4.46	4.52	4.34	4.36	4.33

As listed in Table 2 above, the refrigerants No. 6 through No.10 have slightly lower condensing pressure and evaporating pressure, compared with those of R407C, because the proportion of R125 having a higher vapor pressure than that of R22 is small, and their refrigerating capacity remains substantially equal to that of R407C but their coefficients of performance are more favorable than that of R407C.

In this context, the compositions of the refrigerants No.2 through No.5 and the compositions of the refrigerants No.6 through No.10 are classified into two regions as follows. In the triangular coordinate representing the composition of the mixture refrigerant comprising R32/R125/R134a of the above-mentioned U.S. Patent No. 5,370,811, three lines are depicted: namely, a saturated vapor phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 0°C, a saturated vapor phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 50°C, and a saturated liquid phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 50°C (which also substantially coincides with a saturated liquid phase line at the saturation pressure of R22 at 0°C).

The position of the composition on the saturated vapor phase line of the mixture refrigerant which coincides with

the saturation pressure of R22 at 50°C is substantially midway in a region between the saturated liquid phase line and the saturated vapor phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 0°C. For that reason, at the same pressure as that of R22, the mixture refrigerant has a boiling point lower than 0°C and a dew point higher than 0°C, and demonstrates an average evaporation temperature of 0°C when it is utilized as a working fluid in a heat pump apparatus.

Since it is known that the refrigerating capacity of a refrigerant is substantially proportional to its evaporation temperature, it is appreciated that the refrigerating capacity of a composition which is on the saturated vapor phase line of the mixture refrigerant, which coincides with the saturation pressure of R22 at 50°C, is in substantial agreement with the refrigerating capacity of R22. That is, the compositions of the refrigerants No. 2 through No.5 and the compositions of the refrigerants No. 6 through No.10 are classified into two regions by taking the saturated vapor phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 50°C as borderline, and the composition of 23/25/52 wt% (R407C) is substantially on this borderline.

And, the refrigerating capacity of the refrigerants No.2 through No.5 having a larger proportion of R32 than that of the composition on this borderline is larger than that of R407C. In addition, the refrigerating capacity of the refrigerants No.6 through No.10 which are on this borderline or have a smaller proportion of R32 than that of the composition on this borderline is substantially the same as or smaller than that of R407C. These facts are clearly seen from Table 1 and Table 2.

That is, among the composition ranges specified by U.S. Patent No. 5,370,811, the saturated vapor phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 0°C approximates to the line A which connects the point a<sub>1</sub> (R32/R134a = 43/57 wt%) and the point a<sub>2</sub> (R125/R134a = 73/27 wt%). The saturated liquid phase line of the mixture refrigerant which coincides with the saturation pressure of R22 at 50°C approximates to the line B which connects the point b<sub>1</sub> (R32/R134a = 21/79 wt%) and the point b<sub>2</sub> (R125/R134a = 55/45 wt%). In addition, the saturated vapor phase line of the mixture refrigerant positioned substantially midway which coincides with the saturation pressure of R22 at 50°C approximates to the line C which connects the point c<sub>1</sub> (R32/R134a = 33/67 wt%) and the point c<sub>2</sub> (R125/R134a = 65/35 wt%). For that reason, the compositions No.2 through No.5 are substantially in a region between the line A and the line C, and their refrigerating capacity increases more than that of R407C. In addition, the compositions of the refrigerants No.6 through No.10 are substantially in a region between the line C and the line B, and their refrigerating capacity is substantially the same as or decreases lower than that of R407C.

In addition, the composition of the ternary mixture refrigerant comprising R32/R125/R134a as discussed above is a combination of a binary azeotropic mixture refrigerant comprising R32/R125 and R134a, and a temperature gradient of the binary azeotropic mixture refrigerant comprising R32/R125 at an average saturation temperature of 0°C shown by the diagram in FIG. 2 is obtained. From FIG. 2, it is appreciated that the composition of 23/25/52 wt% (R407C) is a combination of a mixture refrigerant of R32/R125 (48/52 wt%) having non-azeotropic property and R134a. By contrast, it is appreciated that the compositions of the refrigerant No. 2 through No. 10 which demonstrate favorable coefficient of performance have a larger proportion of R32 than those on the line D which connects the point of R32/R125 (60/40 wt%) and the vertex for R134a, and are a combination of the mixture refrigerant comprising R32/R125 which can be handled almost as a single refrigerant and R134a.

On the basis of the above discussion, a more restricted suitable composition range has been classified. In the case of applying a mixture refrigerant having a condensing temperature gradient and an evaporation temperature gradient to a practical heat pump apparatus, an actual condensing temperature gradient in a condenser becomes larger by a pressure loss than the condensing temperature gradient shown in Table 1 and Table 2, and an actual evaporating temperature gradient in an evaporator becomes smaller by a pressure loss than the evaporating temperature gradient shown in Table 1 and Table 2. For that reason, the operation temperature of the refrigerating cycle changes from the data shown in Table 1 and Table 2, and thus it is necessary to grasp the actual characteristics of the refrigerants in the practical heat pump apparatus.

## EXAMPLE 2

A description will be made on an example wherein some specific examples of the ternary mixture refrigerant in accordance with the present invention are applied to a heat pump apparatus utilizing air as its heat source.

The air-heat source heat pump apparatus shown by FIG. 3 comprises a refrigerating cycle configured by connecting a compressor 2 driven by an inverter unit 1, an accumulator 3, a four-way valve 4, an outdoor unit 7 including an outdoor heat transfer unit 5 which acts as a condenser or an evaporator and an expansion valve 6, and an indoor unit 9 including an indoor heat transfer unit 8 which acts as a condenser or an evaporator, together with pipe lines. The ternary mixture refrigerant is injected into this refrigerating cycle as a working fluid and sealed, and an oil of an ester which is suited for the fluorohydrocarbons containing no chlorine is injected into the compressor 1 and sealed.

In this refrigerating cycle, the refrigerant circulates in the direction of dashed arrows during the cooling mode operation and in the direction of the solid arrows during the heating mode operation. The outdoor heat transfer unit 5 is an air-cooled heat transfer unit having two rows of 6 paths and the indoor heat transfer unit 8 is an air-cooled heat transfer

unit having four rows of four paths, and the flow of the refrigerant is designed to be a counter flow against the air flow during the cooling mode operation.

Table 3 summarizes characteristics of the previously described mixture refrigerants No. 1 through No.10 comprising R32/R125/R134a when they are utilized in the heat pump apparatus shown by FIG. 3 during cooling mode and heating mode operations. The disclosed characteristics are obtained by adjusting the charging amounts of the mixture refrigerant and the openings of the expansion valve 6 so as to maximize the coefficients of performance. The disclosed characteristics are represented by the coefficient of performance measured by taking the value for R407C as reference and finely adjusting the rotational frequency of the compressor 2 driven by the inverter unit 1 so as to correct fine differences in capacity shown in Table 1 and Table 2 and make the capacity equal.

Table 3

Refrigerant No.	1	2	3	4	5
COP in cooling mode (Ratio to R407C)	1.000	1.075	1.076	1.084	1.049
COP in heating mode (Ratio to R407C)	1.000	1.026	1.051	1.075	1.042
Refrigerant No.	6	7	8	9	10
COP in cooling mode (Ratio to R407C)	1.041	1.068	1.024	1.036	1.041
COP in heating mode (Ratio to R407C)	0.996	1.007	0.995	0.998	1.021
COP: coefficient of performance					

As clearly appreciated from Table 3 above, coefficients of performance of the mixture refrigerants No.2 through No.5 during both the cooling and heating mode operations are greatly improved, compared with the ideal coefficients of performance shown in Table 1, because their increasing performance compared with that of R407C is made to be the same by finely adjusting the rotational frequency of the compressor 2 in the direction of decreasing the frequency by the inverter unit 1.

In addition, with the mixture refrigerants No.6 through No.10, their coefficients of performance during the cooling mode operation are also greatly improved compared with the ideal coefficients of performance shown in Table 2 and increased compared with that of R407C. During the heating mode operation, however, only substantially the same coefficients of performance as that of R407C can be expected with the mixture refrigerants, because the decreased performance is made to be the same by finely adjusting the rotational frequency of the compressor 2 by the inverter unit 1 to the same or in the direction of increasing the frequency.

In particular, it is appreciated that, among the tested mixture refrigerants shown in Table 3, the refrigerants whose coefficients of performance during the cooling mode operation are greatly improved compared with their ideal values are those of the compositions having a larger proportion of R32 than those substantially on the line D, i.e., the refrigerants No.2 through No.5, and No.7 through No.10. In addition, among the tested mixture refrigerants shown in Table 3, with the refrigerants whose coefficients of performance during the cooling mode operation are greatly improved compared with their ideal values and whose refrigerating capacity is increased, the effects of decreased condensing pressure, increased evaporating pressure and decreased compression ratio are great. The ideal evaporation temperature gradients listed in Table 1 and Table 2 are larger than those of R407C. These facts are suited for the air-cooled heat transfer unit which is designed to be a counter flow during the cooling mode operation. The disclosed results were first found during the process of the research and development to this invention.

In addition, among the mixture refrigerants No.6 through No.10, since No.9 or No.10 is effective for improving the coefficient of performance during the cooling mode operation and has smaller proportions of R32 and R125 having a high vapor pressure as compared with that of R407C, the condensing pressure can be made low, and thus is suited for the heat pump apparatus mainly for the cooling mode operation. However, if the proportion of R32 is decreased more than that, the refrigerating capacity of the mixture refrigerant decreases as shown in Table 2 and an improvement in the coefficient of performance becomes hard to expect because an input increases in order to make the capacity the same. In addition, all the tested mixture refrigerants shown in Table 3 suggest that small differences of not more than 2 - 5% in the proportions of R32, R125 and R134a to be incorporated in the mixture have an influence on the performance of the heat pump apparatus, and thus it is desirable that the respective components are in the composition error of not more than  $\pm 2\%$ .

## EXAMPLE 3

FIG. 4 is a composition diagram of the mixture refrigerant comprising R32/R125/R134a represented by a triangular coordinate. In this figure, each of the white circles indicates the respective compositions of the previously described mixture refrigerants No.1 through No.10, and each of the black circles indicates the respective saturated vapor phase compositions of the respective saturated liquid phases of the compositions indicated by the white circles which are in an equilibrium state at 23°C. Lines connecting the white circles and the black circles are tie lines for indicating that the pairs are in equilibrium state.

In addition, FIG. 4 further incorporates by reference nonflammable borderlines of the composition R32/R125/R134a shown in Attachment 2, Exhibit 7 of the previously described Request for Refrigerant Safety Classification and Nomenclature for Zeotropic Ternary Refrigerant Mixture by E.I. du Pont de Nemours and Company. In this diagram, the solid line indicates a nonflammability borderline at an atmospheric temperature of 100°C and the dot-dashed line indicates a nonflammability borderline at room temperature (about 23°C), respectively. The broken line indicates the saturated liquid phase composition in a state in equilibrium with the saturated vapor phase composition at 23°C which coincides with the solid line.

It is believed that a mixture refrigerant having a smaller proportion of R32 than that on the broken line is nonflammable in both its liquid phase composition and equilibrium vapor phase composition, even if R32 having a flammability is concentrated in its vapor phase and the composition in an environment at room temperature of 23°C is subjected to a flammability test at an atmospheric temperature of 100°C. This nonflammable composition is specified as a composition having a smaller proportion of R32 than that on the line E which connects the point  $e_1$  (R32/R125 = 53/47 wt%) and the point  $e_2$  (R32/R134a = 19/81 wt%). Therefore, it is believed that among the mixture refrigerants which demonstrate favorable coefficient of performance as shown in Table 3, the refrigerants No.1 (R407C), Nos.2 - 4 and Nos.8 - 10 are nonflammable.

By contrast, the mixture refrigerants No.5 through No.7 have a possibility that their vapor phase compositions in equilibrium state with their liquid phase compositions become flammable when the compositions at room temperature such as 23°C are placed at an atmospheric temperature of 100°C, and thus should be excluded. In addition, the composition at an intersecting point r at which the line B intersects the line E shown in Example 1 can reduce the flammability of R32, because the composition contains at least R125 which has a large nonflammable effect.

## EXAMPLE 4

Investigation was made on the global warming potential (GWP) of the ternary mixture refrigerant in accordance with the present invention.

Table 4 summarizes the relative values of GWP of the mixture refrigerants No.1 through No.10 for 20 years, 100 years and 500 years, respectively, calculated by defining GWP of carbon dioxide (CO<sub>2</sub>) as 1.

Table 4

Refrigerant No.	1	2	3	4	5
GWP of 20 years (Ratio to CO <sub>2</sub> )	3300	3100	3100	3200	3100
GWP of 100 years (Ratio to CO <sub>2</sub> )	1600	1400	1400	1500	1400
GWP of 500 years (Ratio to CO <sub>2</sub> )	530	470	470	480	460
Refrigerant No.	6	7	8	9	10
GWP of 20 years (Ratio to CO <sub>2</sub> )	2900	3000	3200	3200	3100
GWP of 100 years (Ratio to CO <sub>2</sub> )	1100	1300	1500	1400	1300
GWP of 500 years (Ratio to CO <sub>2</sub> )	350	420	500	460	430

The mixture refrigerants No.2 through No.10 shown above have a small GWP for the entire time periods as compared with R407C having a composition No.1 of 23/25/52 wt% because their proportions of R125 having a high GWP are small. In addition to this, it is possible to make GWP of the mixture refrigerants No.2 through No.10 smaller than that of R22 even if a comparison is made at a long term of 500 years. However, it should be noted here that although the mixture refrigerant No.6 or No.7 has small GWP and is favorable from the viewpoint of only GWP, it may have a possibility of having a flammable property if the proportion of R125 having a large nonflammable effect is too small compared with R32 having a flammable property, as appreciated from the description of Example 3.

As described previously, the mixture refrigerants No.2, No.3, No.4, No.9 and No.10 specified by Example 1, Example 2 and Example 3 have favorable coefficient of performance, and are considered to be nonflammable, and, in addition, it is possible to lower GWP as compared with the promising R407C.

As described previously, in accordance with the present invention, it is possible to provide a mixture refrigerant having substantially equal refrigerating capacity, high coefficient of performance, low GWP and nonflammable even in its vapor phase composition in addition to its liquid phase composition, compared with the promising composition of 23/25/52 wt% (R407C), by further restricting a composition range of a ternary mixture refrigerant comprising R32/R125/R134a, which has hitherto been proposed as a substitute for R22, more suitably for a working fluid for a heat pump apparatus.

It is understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the scope and spirit of the present invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the description as set forth herein, but rather that the claims be construed as encompassing all the features of patentable novelty that reside in the present invention, including all features that would be treated as equivalents thereof by those skilled in the art to which this invention pertains.

## Claims

1. A ternary mixture refrigerant comprising R32/R125/R134a in a composition range defined by a straight line A which connects a point  $a_1$  (R32/R134a = 43/57 wt%) and a point  $a_2$  (R125/R134a = 73/27 wt%), a line B which connects a point  $b_1$  (R32/R134a = 21/79 wt%) and a point  $b_2$  (R125/R134a = 55/45 wt%), a line D which connects a point  $d_1$  (R32/R125 = 60/40 wt%) and a vertex of R134a, and a line E which connects a point  $e_1$  (R32/R125 = 53/47 wt%) and a point  $e_2$  (R32/R134a = 19/81 wt%) in a ternary composition chart of R32, R125 and R134a represented by a triangular coordinate in FIG. 1.
2. A heat pump apparatus comprising a refrigerating cycle which utilizes the ternary mixture refrigerant in accordance with claim 1.
3. The heat pump apparatus in accordance with claim 2, wherein said mixture refrigerant is in a composition range defined by a line C which connects a point  $c_1$  (R32/R134a = 33/67 wt%) and a point  $c_2$  (R125/R134a = 65/35 wt%) and the line A, and wherein said refrigerating cycle comprises an inverter unit for driving a compressor and performs both cooling mode and heating mode operations.
4. The heat pump apparatus in accordance with claim 2, wherein said mixture refrigerant is in a composition range defined by a line C which connects a point  $c_1$  (R32/R134a = 33/67 wt%) and a point  $c_2$  (R125/R134a = 65/35 wt%) and the line B, and wherein said refrigerating cycle performs a cooling mode operation.
5. The heat pump apparatus in accordance with claim 2, wherein said mixture refrigerant consists essentially of R32/R125/R134a of about 25/10/65 wt%, and wherein said refrigerating cycle is so designed as to perform a counter flow heat transfer in a cooling mode operation.
6. The heat pump apparatus in accordance with claim 2, wherein said mixture refrigerant consists essentially of R32/R125/R134a of about 25/15/60 wt%, and wherein said refrigerating cycle is so designed as to perform a counter flow heat transfer in a cooling mode operation.

FIG. 1

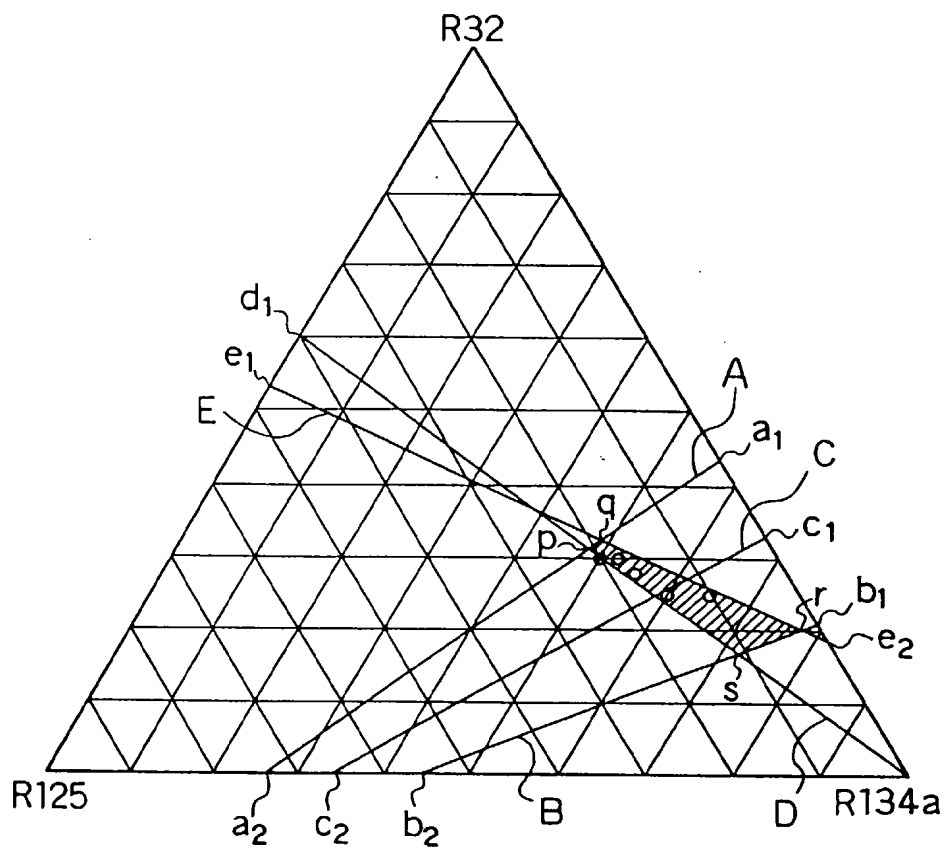


FIG. 2

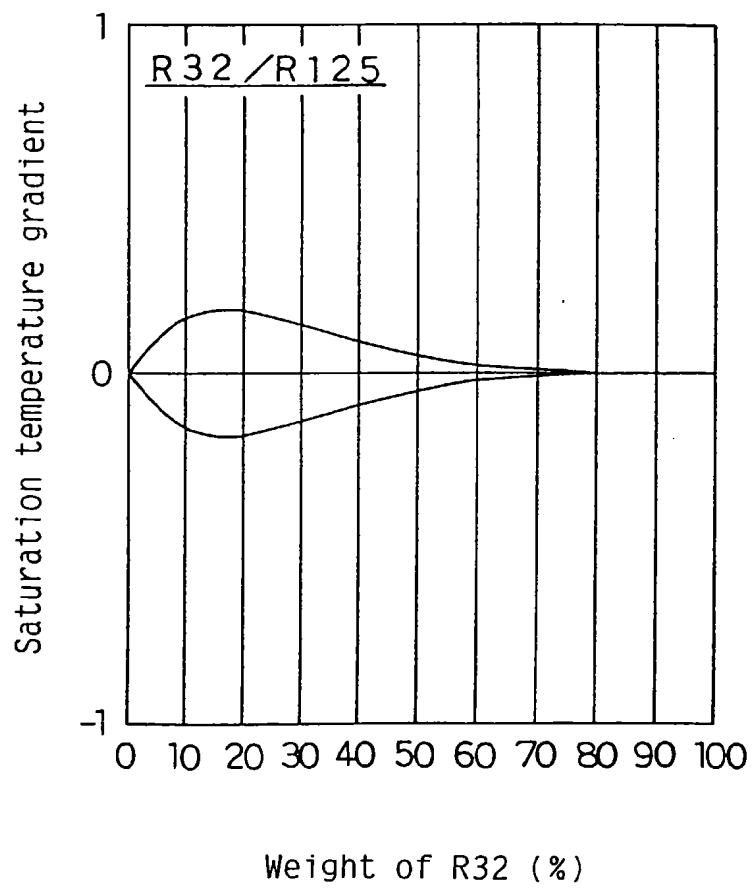




FIG. 3

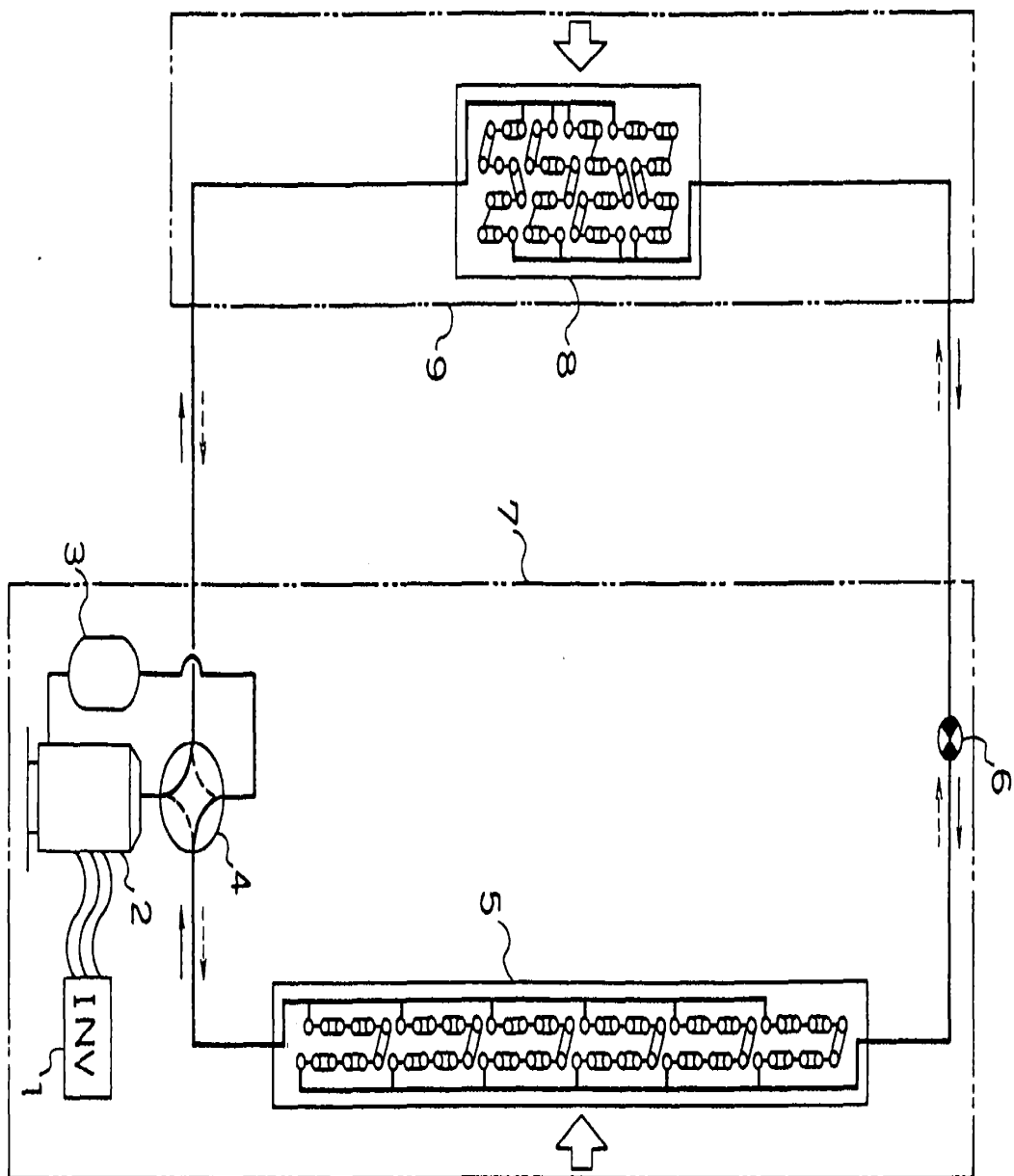
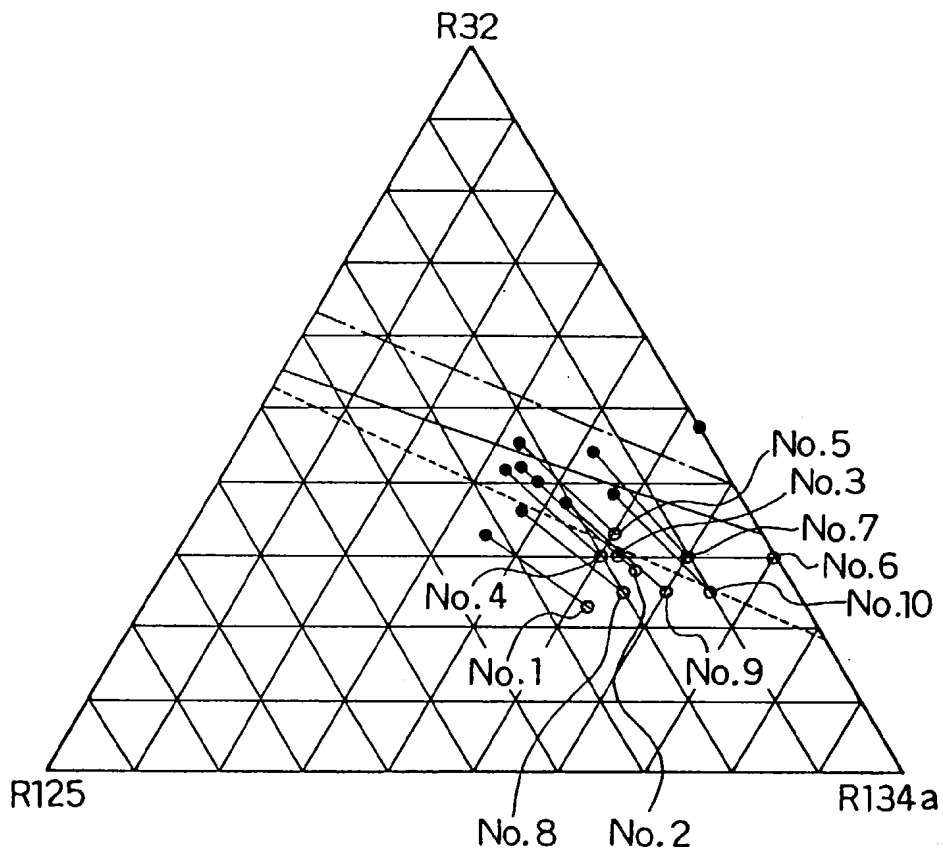


FIG. 4





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 97 10 6576

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,X	EP 0 509 673 A (ICI PLC) 21 October 1992 * page 5, line 12 - line 20 * * example 1 *	1-3	C09K5/04
D,X	WO 92 11339 A (DU PONT) 9 July 1992 * page 3, line 1 - line 26 * * example 6 *	1,2,4	
D,X	EP 0 430 169 A (MATSUSHITA ELECTRIC IND CO LTD) 5 June 1991 * examples 7,A1 *	1-4	
X	DATABASE WPI Section Ch, Week 9441 Derwent Publications Ltd., London, GB; Class E16, AN 94-330370 XP002039438 & JP 06 256 757 A (DAIKIN KOGYO KK) , 13 September 1994 * abstract *	1-3	
D,A	EP 0 451 692 A (DAIKIN IND LTD) 16 October 1991 * page 2, line 20 - line 38 * * figure 3; example 3 *	1,2	<div>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</div> C09K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 September 1997	Examiner Puetz, C
<div>CATEGORY OF CITED DOCUMENTS</div> <div> X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document </div> <div> T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  .....  &amp; : member of the same patent family, corresponding document </div>			

EPO FORM 1503 03.82 (P04C01)

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	34376553
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	21-NOV-2018
<b>Filing Date:</b>	25-MAY-2018
<b>Time Stamp:</b>	14:43:32
<b>Application Type:</b>	Utility under 35 USC 111(a)

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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	821920-1033__SIDS.pdf	1034848	no	4
			702e2e9c41f63258948f3da2a082a1b9127e3f68		

### Warnings:

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<b>Information:</b>					
2	Foreign Reference	WO0123493A1.pdf	1089808	no	35
			773181a8fdc83fc8a40dd2fedb87b517f7bf6eeb		
<b>Warnings:</b>					
<b>Information:</b>					
3	Foreign Reference	JPH08319479.pdf	130676	no	1
			ec7eadeb8427bce5a7bdc404378443a184c6fb2		
<b>Warnings:</b>					
<b>Information:</b>					
4	Foreign Reference	EP0811670A1.pdf	758070	no	14
			28aeceb3f79d053c91245308b9200802c3b923d		
<b>Warnings:</b>					
<b>Information:</b>					
5	Non Patent Literature	FIRST_OFFICE_ACTION.pdf	1989310	no	8
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/989,655	05/25/2018	1761	865	821920-1033	7	3

**CONFIRMATION NO. 5897**  
**UPDATED FILING RECEIPT**

24504  
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ATLANTA, GA 30339



Date Mailed: 09/11/2018

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**Applicant(s)**

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Steffan Thomas, Buckhead, GA;

**Power of Attorney:** None

**Domestic Priority data as claimed by applicant**

This application is a CON of 13/493,491 06/11/2012 PAT 9982179  
which is a CON of 12/961,045 12/06/2010 PAT 8197706  
which is a CON of 10/937,736 09/08/2004 ABN  
which claims benefit of 60/501,049 09/08/2003

**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.*

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/989,655**

**Projected Publication Date:** 12/20/2018

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

**Preliminary Class**

252

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

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

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

**NOT GRANTED**

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

---

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



<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875						Application or Docket Number 15/989,655			
<b>APPLICATION AS FILED - PART I</b>									
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A			
SEARCH FEE (37 CFR 1.16(k), (l), 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(j))	7	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			
<b>APPLICATION AS AMENDED - PART II</b>									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.									



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033

**CONFIRMATION NO. 5897**

**INFORMAL NOTICE**



24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

Date Mailed: 09/11/2018

**INFORMATIONAL NOTICE TO APPLICANT**

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

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
Kenneth M. Ponder  
Steffan Thomas

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

/fasrat/



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AUG 20 2018

August 20, 2018

[Matter No. 821920-1033]

TO: USPTO

FROM: Todd Deveau

FAX: 571-273-8300

FAX: 770-951-0933

TEL: 770-933-9500

TEL: 571-272-1000

EMAIL: todd.deveau@thomashorstemeyer.com

RE: U.S. Serial No. 15/989,655

Please find enclosed a Transmittal Form, Response to Notice to File Missing Parts, a copy of the Notice to File Missing Parts, Information Disclosure Statement, and Form 1449, for U.S. Serial No. 15/989,655.

Number of Pages (Including This Cover Sheet): - 10 - Page(s)

PLEASE ACKNOWLEDGE SAFE AND CLEAR RECEIPT OF ALL PAGES.

#### CONFIDENTIALITY NOTICE

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AUG 20 2018

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Kenneth M. Ponder

Group Art: 1761

Serial No.: 15/989,655

Docket No.: 821920-1033

Filed: May 25, 2018

Confirmation No.: 5897

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT****RESPONSE TO NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL  
APPLICATION**Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Sir:

In response to the Notice to File Missing Parts of Non-Provisional Application -- Filing  
Date Granted, dated June 18, 2018, please find enclosed:

1. Transmittal Form;
2. A copy of the Notice to File Missing Parts of Nonprovisional Application;
3. Information Disclosure Statement;
4. Information Disclosure Statement Form 1449; and
5. Government fee in the amount of \$865.00 to cover the additional surcharge fee for filing this Response to the Missing Parts Notice.

The Commissioner is authorized to charge Deposit Account 20-0778 for the required fees  
and for any deficiencies or credit any over payments.

Respectfully Submitted,

THOMAS | HORSTEMEYER, LLP

/Todd Deveau/

By:

\_\_\_\_\_  
Todd Deveau; Reg. No. 29,5263200 Windy Hill Road, SE  
Suite 1600E  
Atlanta, GA 30339  
(770) 933-9500



## UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033

CONFIRMATION NO. 5897

## FORMALITIES LETTER



24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

Date Mailed: 06/18/2018

## NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

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

**SUMMARY OF FEES DUE:**

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

- \$ 75 basic filing fee.
- \$ 80 surcharge.
- \$ 330 search fee.
- \$ 380 examination fee.
- \$( 0) previous unapplied payment amount.
- \$ 865 TOTAL FEE BALANCE DUE.

**Items Required To Avoid Processing Delays:**

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's

page 1 of 2

oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
Kenneth M. Ponder  
Steffan Thomas

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

Replies should be mailed to:

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

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

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

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

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

/tuguyen/

---

Doc Code: TRAN.LET

Document Description: Transmittal Letter

AUG 20 2018

PTO/SB/21 (07-09)

Approved for use through 11/30/2020. OMB 0851-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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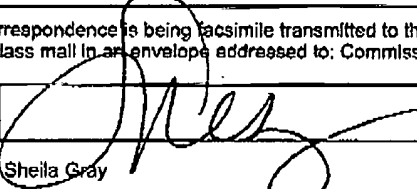
<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)	Application Number	15/889,655	
	Filing Date	May 25, 2018	
	First Named Inventor	Kenneth M. Ponder	
	Art Unit	1761	
	Examiner Name	TBD	
Total Number of Pages in This Submission	10	Attorney Docket Number	821920-1033

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input checked="" type="checkbox"/> Information Disclosure Statement  <input type="checkbox"/> Certified Copy of Priority Document(s) <input checked="" type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input checked="" type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):
Remarks The Commissioner is authorized to charge the required fee of \$865.00 by this paper, and to credit any overpayment to Deposit Account No. 20-0778 in the name of Thomas I Horstemeyer, LLP.		

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Thomas I Horstemeyer, LLP		
Signature	/Todd Deveau/		
Printed name	Todd Deveau		
Date	August 20, 2018	Reg. No.	29,526

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Sheila Gray	Date	August 20, 2018

This collection of information is required by 37 CFR 1.5. 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 2 hours 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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AUG 20 2018

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Kenneth M. Ponder

Serial No.: 15/989,655

Filed: May 25, 2018

Confirmation No.: 5897

Group Art Unit: 1761

Examiner: TBD

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22  
REFRIGERANT**INFORMATION DISCLOSURE STATEMENTCommissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Sir:

This information disclosure statement is filed in accordance with 37 C.F.R. §§ 1.56, 1.97, and 1.98. Listed on the accompanying form SB-08(a) are documents which may or may not be considered material to the examination of this application. At least some of these documents were made of record in a prior application filed June 11, 2012 and having Serial No. 13/493,491, now U.S. Patent No. 9,982,179, issued May 29, 2018 to which priority is claimed relative to the present application pursuant to 35 U.S.C. §120. Copies of these documents are not being provided pursuant to 37 C.F.R. § 1.98(d)(1) and (2), which provides:

(d) A copy of any patent, publication, pending U.S. application or other information, as specified in paragraph (a) of this section, listed in an information disclosure statement is required to be provided, even if the patent, publication, pending U.S. application or other information was previously submitted to, or cited by, the Office in an earlier application, unless:

(1) The application is properly identified in the information disclosure statement and is relied on for an earlier effective filing date under 35 U.S.C. §120; and

(2) The information disclosure statement submitted in the earlier application complies with a paragraphs (a) through (c) of this section.



The following rights are reserved by the Applicant: the right to establish the patentability of the claimed invention over any of the listed documents should they be applied as reference, the right to prove that some of these documents may not be prior art, and/or the right to prove that some of these documents may not be enabling for the teachings they purport to offer.

This statement should not be construed as a representation that an exhaustive search has been made, or that information more material to the examination of the present application does not exist. The Examiner is specifically requested not to rely solely on the materials submitted herewith. The Examiner is requested to conduct an independent and thorough review of the documents, and to form independent opinions as to their significance.

It is respectfully requested that the Examiner initial and return a copy of the enclosed PTO-1449 to indicate the documents have been considered.

Respectfully submitted,

**THOMAS | HORSTEMEYER, LLP**

/Todd Deveau/

By:

Todd Deveau; Reg. No. 29,526

3200 Windy Hill Road, SE  
Suite 1600E  
Atlanta, GA 30339  
(770) 933-9500

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

**AUG 20 2018**

PTO/SB/08a (02-18)

Approved for use through 11/30/2020, OMB 0851-0031  
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.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Not for submission under 37 CFR 1.99)	Application Number		15989655	
	Filing Date		2018-05-25	
	First Named Inventor	Kenneth M. Ponder		
	Art Unit	1761		
	Examiner Name	TBD		
	Attorney Docket Number	821920-1033		

U.S. PATENTS								
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
	1	6207071	B1	2001-03-27	Takigawa et al.			
	2	9982179	B2	2018-05-29	Ponder et al.			
	3	8197706	B2	2012-06-12	Ponder et al.			
If you wish to add additional U.S. Patent citation information please click the Add button.								
U.S. PATENT APPLICATION PUBLICATIONS								
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
	1							
If you wish to add additional U.S. Published Application citation information please click the Add button.								
FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup>	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							<input type="checkbox"/>

EFS Web 2.1.18

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		15989655
	Filing Date		2018-05-25
	First Named Inventor	Kenneth M. Ponder	
	Art Unit	1761	
	Examiner Name	TBD	
Attorney Docket Number		821920-1033	

If you wish to add additional Foreign Patent Document citation information please click the Add button

### NON-PATENT LITERATURE DOCUMENTS

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 <sup>5</sup>
	1	List of refrigerants from Wikipedia, <a href="https://en.wikipedia.org/wiki/List_of_refrigerants">https://en.wikipedia.org/wiki/List_of_refrigerants</a> , last modified on 19 January 2017, 13 pages.	<input type="checkbox"/>
	2	Environmental Protection Agency (EPA), Air and Radiation Stratospheric Protection Division 6205J, "Substitute Refrigerants Under SNAP as of October 4, 2011", SNAP Information: <a href="http://www.epa.gov/ozone/snap">http://www.epa.gov/ozone/snap</a> , 18 pages.	<input type="checkbox"/>
	3	Summary of Substitute Refrigerants Listed in SNAP Notice 25, 10 pages.	<input type="checkbox"/>
	4	ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s, and u to ANSI/ASHRAE Standard 34-2004, "Designation and Safety Classification of Refrigerants", 2006 Supplement, ISSN 1041-2336, 35 pages.	<input type="checkbox"/>

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

### EXAMINER SIGNATURE

Examiner Signature	Date Considered
--------------------	-----------------

\*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.

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

The PTO did not receive the following  
Noted Item(s) 4 HPL

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	15989655
	Filing Date	2018-05-25
	First Named Inventor	Kenneth M. Ponder
	Art Unit	1761
	Examiner Name	TBD
	Attorney Docket Number	821920-1033

### 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	/Todd Deveau/	Date (YYYY-MM-DD)	2018-08-20
Name/Print	Todd Deveau	Registration Number	29526

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.

Document code: WFEE

United States Patent and Trademark Office  
Sales Receipt for Accounting Date: 09/10/2018

MTEKLEMI	SALE	#00000007	Mailroom Dt:	08/20/2018	200778	15989655
		01	FC : 4011	75.00	DA	
		02	FC : 2111	330.00	DA	
		03	FC : 2311	380.00	DA	
		04	FC : 2051	80.00	DA	



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/989,655	05/25/2018	1761	0.00	821920-1033	7	3

CONFIRMATION NO. 5897

FILING RECEIPT



24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

Date Mailed: 06/18/2018

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

**Inventor(s)**

Kenneth M. Ponder, Cumming, GA;  
Steffan Thomas, Buckhead, GA;

**Applicant(s)**

Kenneth M. Ponder, Cumming, GA;  
Steffan Thomas, Buckhead, GA;

**Power of Attorney:** None

**Domestic Priority data as claimed by applicant**

This application is a CON of 13/493,491 06/11/2012 PAT 9982179  
which is a CON of 12/961,045 12/06/2010 PAT 8197706  
which is a CON of 10/937,736 09/08/2004 ABN  
which claims benefit of 60/501,049 09/08/2003

**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

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

**If Required, Foreign Filing License Granted:** 06/14/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/989,655**

**Projected Publication Date:** To Be Determined - pending completion of Missing Parts

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

**Preliminary Class**

252

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

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

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

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

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

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

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

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

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

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

**NOT GRANTED**

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

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/989,655	05/25/2018	Kenneth M. Ponder	821920-1033

CONFIRMATION NO. 5897

FORMALITIES LETTER



24504  
THOMAS | HORSTEMEYER, LLP  
3200 WINDY HILL ROAD, SE  
SUITE 1600E  
ATLANTA, GA 30339

Date Mailed: 06/18/2018

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

*Filing Date Granted*

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

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

**SUMMARY OF FEES DUE:**

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

- \$ 75 basic filing fee.
- \$ 80 surcharge.
- \$ 330 search fee.
- \$ 380 examination fee.
- \$( 0) previous unapplied payment amount.
- \$ 865 TOTAL FEE BALANCE DUE.

**Items Required To Avoid Processing Delays:**

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's

oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
Kenneth M. Ponder  
Steffan Thomas

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

Replies should be mailed to:

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

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

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

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

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

/tnguyen/

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875						Application or Docket Number 15/989,655			
<b>APPLICATION AS FILED - PART I</b>									
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A			
SEARCH FEE (37 CFR 1.16(k), (l), 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(j))	7	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			
<b>APPLICATION AS AMENDED - PART II</b>									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.									

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 5897

*Kenneth M. Ponder et al.*

Group Art Unit: TBA

Serial No.: 15/989,655

Examiner: TBA

Filed: May 25, 2018

Docket No. 821920-1033

For: **REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF  
R22 REFRIGERANT**

**PRELIMINARY AMENDMENT**

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

Sir:

In regard to the above-referenced application, the Applicants submit the following preliminary amendments and remarks to be respectively entered and considered prior to examination.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to Deposit Account No. 20-0778.

**IN THE SPECIFICATION**

Please amend the Specification as indicated hereafter wherein the changes are shown by strikethrough or double brackets for deleted matter and underlining for added matter.

Please add the 1<sup>st</sup> paragraph as follows:

**RELATED APPLICATION CROSS-REFERENCE TO RELATED APPLICATIONS**

This application, mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof is a continuation of U.S. Patent Application serial number 13/493,491, filed June 11, 2012, which is a continuation of U.S. Patent Application serial number 12/961,045, filed December 6, 2010, issued as U.S. Patent No. 8,197,706, issued June 12, 2012, which is a continuation of U.S. Patent Application serial number 10/937,736, filed September 8, 2004, now abandoned, which claims priority to and the benefit of provisional application, Serial No. 60/501,049, filed September 8, 2003, now expired.

**AMENDMENTS TO THE CLAIMS**

Please amend the claims as indicated hereafter wherein the changes are shown by strikethrough or double brackets for deleted matter and underlining for added matter.

1.-29. (Cancelled)

30. (Currently Amended) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition designed to achieve a phase change, the refrigerant composition comprising a combination of refrigerant gases, said refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, ~~the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about 32°F or a bubble point at about 41.5°F, wherein the refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethanes wherein the lubricating oil is selected from the group consisting of mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof~~ wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight of the pentafluoroethane and tetrafluoroethane on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

31. (Cancelled)

32. (Currently Amended) A method for refilling an apparatus designed for use with a chlorodifluoromethane refrigerant, the method comprising:

(1) selecting a substitute refrigerant composition designed to achieve a phase change and comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, ~~the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about 32°F or a bubble point at about 41.5°F~~ wherein in the substitute refrigerant said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight of the pentafluoroethane and tetrafluoroethane on the basis of the combined weights of said pentafluoroethane and said tetrafluoroethane totaling 100%, and wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane, and

(2) supplying the substitute refrigerant composition under pressure, in a cylinder can fitted with an outlet compatible with a chlorodifluoromethane recharging manifold of the apparatus; and

~~(3) adding to said apparatus via the manifold the substitute refrigerant composition for chlorodifluoromethane, wherein the refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane, wherein the~~

~~lubricating oil is selected from the group consisting of mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof.~~

33. (Cancelled)

34. (Currently Amended) A refrigerant composition comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, ~~the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about 32°F or a bubble point at about 41.5°F, wherein the refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane, wherein the lubricating oil is selected from the group consisting of mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof~~ wherein in the refrigerant composition said pentafluoroethane is present in an amount of 59% to 57% by weight and said tetrafluoroethane is present in an amount of 41% to 43% by weight of the combined weight of the pentafluoroethane and tetrafluoroethane on the basis of the combined weights of said pentafluoroethane, and said tetrafluoroethane totaling 100% and wherein the tetrafluoroethane is 1,1,1,2- tetrafluoroethane.

35.-36. (Cancelled)



37. (Previously Presented) In the apparatus of claim 30, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

38. (Currently Amended) In the apparatus of claim 30, wherein the ~~lubricating oil~~ refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.

39. (Previously Presented) The method according to claim 32, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.

40. (Currently Amended) The method according to claim 32, wherein the ~~lubricating oil~~ substitute refrigerant composition includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibit, a surfactant, a foaming agent, and mixtures thereof.

41.-46. (Cancelled)

**REMARKS**

The parent application was filed with claims 30-46. Claims 31, 33, 35-36, and 41-46 have been canceled herein, without prejudice, disclaimer or waiver. Applicants expressly reserve the right to pursue canceled subject matter in one or more divisional and/or continuation applications. Claims 30, 32, 34, 38, and 40 have been amended herein and which are believed fully supported by the original specification and claims. No new matter has been added.

Page 1 of the specification has been amended to add a priority claim. No new matter has been added by this amendment.

In light of this Preliminary Amendment, the claims are believed to be allowable, and Applicants respectfully request notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance.

Respectfully submitted

**THOMAS | HORSTEMEYER, LLP**

**/Todd Deveau/**

\_\_\_\_\_  
Todd Deveau, Reg. No. 29,526

3200 Windy Hill Rd. SE  
Suite 1600E  
Atlanta, Georgia 30339  
(770) 933-9500

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	32805295
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. Ponder
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
<b>Filer Authorized By:</b>	Todd Deveau.
<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	05-JUN-2018
<b>Filing Date:</b>	
<b>Time Stamp:</b>	13:24:23
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	821920-1033__Preliminary_Amendment.pdf	252302 a427be1f1d05e5eecd7ed41ef81ac9de85de2641	no	7

### Warnings:

Dynatemp v. R421A - IPR2020-01660

R421A Exhibit 2003 Page 287 of 322

<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	252302
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>	

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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		
<p>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.</p> <p>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.</p>			

**Secrecy Order 37 CFR 5.2:**

<input type="checkbox"/>	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				<a href="#">Remove</a>	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Kenneth	M.	Ponder			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Cumming	State/Province	GA	Country of Residence	US	

**Mailing Address of Inventor:**

Address 1	105 Highland View Drive					
Address 2						
City	Cumming	State/Province	GA			
Postal Code	30040	Country	US			

Inventor	2				<a href="#">Remove</a>	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Steffan		Thomas			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Buckhead	State/Province	GA	Country of Residence	US	

**Mailing Address of Inventor:**

Address 1	4250 Bethany Road					
Address 2						
City	Buckhead	State/Province	GA			
Postal Code	30625	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:**

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For further information see 37 CFR 1.33(a).

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

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

Customer Number	24504		
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### Application Information:

Title of the Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		
Attorney Docket Number	821920-1033	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	1	Suggested Figure for Publication (if any)	

### 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.

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Customer Number	24504		

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## 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	13493491	2012-06-11		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13493491	Continuation of	12961045	2010-12-06	8197706	2012-06-12
Prior Application Status	Abandoned		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12961045	Continuation of	10937736	2004-09-08		
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
10937736	Claims benefit of provisional	60501049	2003-09-08		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> 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)<sup>i</sup> 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 <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>i</sup> (if applicable)	
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.				Add

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

<p>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.</p> <p><input type="checkbox"/> 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.</p>	
--	--



<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## 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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

## 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.				
<b>Applicant</b>	1			<a href="#">Remove</a>
<p>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.</p>				
<a href="#">Clear</a>				
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:				
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>				
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; width: 450px; height: 20px;"></div>				
If the Applicant is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>
<b>Mailing Address Information For Applicant:</b>				
Address 1	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>			
Address 2	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>			
City	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	State/Province	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
Country	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	Postal Code	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
Phone Number	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	Fax Number	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
Email Address	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>			
Additional Applicant Data may be generated within this form by selecting the Add button. <a href="#">Add</a>				

## 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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

<b>Assignee</b>   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.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. <input type="checkbox"/>				
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<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Mailing Address Information For Assignee including Non-Applicant Assignee:</b>				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country <sup>i</sup>	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

**Signature:**

**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.

<b>Signature</b>	/Todd Deveau/		Date (YYYY-MM-DD)	2018-05-25
First Name	Todd	Last Name	Deveau	Registration Number
				29526
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	821920-1033
		Application Number	
Title of Invention	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT		

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

## Privacy Act Statement

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

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

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

**ABSTRACT**

An apparatus and method wherein potential ozone layer-damaging chlorodifluoromethane (Refrigerant R-22) is substituted with a mix of less environmentally damaging refrigerants pentafluoroethane and tetrafluoroethane in chlorodifluoromethane-based air-cooling systems mainly in residential cooling. While less environmentally damaging than chlorodifluoromethane, the substitute refrigerant has a temperature-pressure relationship similar to that of chlorodifluoromethane, making the substitute refrigerant suitable for use with chlorodifluoromethane-based air-cooling systems. In this event, it is mixed with a relatively small percentage of a lubricating oil which is compatible with both the unit refrigerant and typical R-22 system design.

## Claims

What is claimed as the invention is:

1 - 29.(Cancelled)

5

30. (New) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition designed to achieve a phase change, the refrigerant composition comprising a combination of refrigerant gases, said refrigerant gases consisting of a blend of  
10 tetrafluoroethane and pentafluoroethane, the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about -32°F or a bubble point at about -41.5°F, wherein the refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and  
15 is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethanes wherein the lubricating oil is selected from the group consisting of mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof.

31. (New) In the apparatus of claim 30, wherein the blend exhibits a dew point at about  
20 -32°F and a bubble point at about -41.5°F.

32. (New) A method for refilling an apparatus designed for use with a chlorodifluoromethane refrigerant, the method comprising:

(1) selecting a substitute refrigerant composition designed to achieve a phase  
25 change and comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about -32°F or a bubble point at about -41.5°F,

(2) supplying a the substitute refrigerant composition under pressure, in a cylinder can fitted with an outlet compatible with a chlorodifluoromethane recharging manifold of the apparatus; and

5 (3) adding to said apparatus via the manifold the substitute refrigerant composition for chlorodifluoromethane, wherein the refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane, wherein the lubricating oil is selected from  
10 the group consisting of mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof.

33. (New) The method of claim 32, wherein the blend exhibits a dew point at about -32°F and a bubble point at about -41.5°F.

15

34. (New) A refrigerant composition comprising a combination of refrigerant gases, the refrigerant gases consisting of a blend of tetrafluoroethane and pentafluoroethane, the ratio of the tetrafluoroethane to the pentafluoroethane being selected such that the blend exhibits a dew point at about -32°F or a bubble point at about -41.5°F, wherein the  
20 refrigerant composition further comprises non-refrigerant gas components, said non-refrigerant gas components including a lubricating oil, wherein the lubricating oil is present up to about 20% by weight of the refrigerant gases and is soluble in chlorodifluoromethane, tetrafluoroethane and pentafluoroethane, wherein the lubricating oil is selected from the group consisting of mineral oil, synthetic alkyl aromatic  
25 lubricants, and mixtures thereof.

35. (New) The refrigerant composition of claim 34, wherein the blend exhibits a dew point at about -32°F and a bubble point at about -41.5°F.



36. (New) The refrigerant composition according to claim 34, wherein the lubricating oil includes an additive selected from the group consisting of further includes an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.
- 5 37. (New) In the apparatus of claim 30, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.
38. (New) In the apparatus of claim 30, wherein the lubricating oil includes an additive  
10 selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.
39. (New) The method according to claim 32, wherein the apparatus is selected from  
15 the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.
40. (New) The method according to claim 32, wherein the lubricating oil includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibit, a surfactant, a foaming agent, and mixtures thereof.  
20
41. (New) In the apparatus of claim 30, wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane.
42. (New) The method of claim 32, wherein the tetrafluoroethane is 1,1,1,2-  
25 tetrafluoroethane.
43. (New) The refrigerant composition of claim 34, wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane.

44. (New) In the apparatus of claim 41, wherein in the substitute refrigerant said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.
- 5 45. (New) The method according to claim 42, wherein in the substitute refrigerant said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.
- 10 46. (New) The refrigerant composition according to claim 43, wherein said pentafluoroethane is present in the ratio of about 58% by weight to said tetrafluoroethane present in an amount of about 42% by weight.

## REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT

### **RELATED APPLICATION**

5

This application, mineral oil, synthetic alkyl aromatic lubricants, and mixtures thereof is a continuation of U.S. Patent Application serial number 12/961,045 filed December 6, 2010, which is a continuation of U.S. Patent Application serial number 10/937,736 filed September 8, 2004, which claims priority to and the benefit of  
10 provisional application, Serial No. 60/501,049 filed September 8, 2003.

### **BACKGROUND OF THE INVENTION**

#### 1. Field Of The Invention

The present invention relates to the replacement of Refrigerant R-22 (chlorodifluoromethane) refrigerant with a blend refrigerant that is less damaging to the  
15 ozone layer in systems designed to use Refrigerant R-22 (chlorodifluoromethane). More particularly the present invention relates to an improved refrigerant composition, method and apparatus for refrigeration wherein two non-Refrigerant R-22 refrigerants are mixed in a defined ratio such that the temperature-pressure relationship of the mix approximates that of Refrigerant R-22 (chlorodifluoromethane). The mixture is compatible with  
20 Refrigerant R-22 (chlorodifluoromethane) so that it can be added to supplement and replace Refrigerant R-22 (chlorodifluoromethane). A further particularity of the instant invention relates to an improved method and apparatus for refrigeration wherein refrigerant mixture is mixed with a soluble lubricating oil to provide lubrication to the apparatus. The lubricant is soluble in both the mixture of the invention and Refrigerant  
25 R-22 (chlorodifluoromethane) refrigerant.

## 2. General Background

Until recently, R-22 refrigerant chlorodifluoromethane (hereinafter sometimes called “Refrigerant R-22 (chlorodifluoromethane)”) was the major, if not sole refrigerant, used in residential air-conditioners, refrigerators, freezers and window air-conditioning units. Refrigerant R-22 (chlorodifluoromethane) is a trademark of E. I. du Pont de Nemours & Co. Inc. for chlorodifluoromethane. Hereinafter, “Refrigerant R-22 (chlorodifluoromethane)” is used in this specification to denote chlorodifluoromethane, regardless of the source.

Recently, however, Refrigerant R-22 (chlorodifluoromethane) has come under attack both nationally and internationally as an ozone layer-damaging chemical. In recent years, both the national and international scientific communities have linked Refrigerant R-22 (chlorodifluoromethane) with damage to the earth’s protective ozone layer. Air-conditioners, refrigerator/freezers and window air-conditioning units containing R-22 are believed to be a global source of ozone-damaging material.

In response to scientific concern and a national and global outcry over the use of Refrigerant R-22 (chlorodifluoromethane) in air-conditioning, the United States Congress has acted to first reduce and then ban the use of Refrigerant R-22 (chlorodifluoromethane) in air-conditioning units.

As a first step toward phasing out the use of Refrigerant R-22 (chlorodifluoromethane) in air-conditioning units, Congress is phasing out the use of Refrigerant R-22 (chlorodifluoromethane) in new equipment effective 01/01/2015 and has banned the sale of Refrigerant R-22 (chlorodifluoromethane) in any size container as of 01/01/2020. One of the first areas in which the use of Refrigerant R-22 (chlorodifluoromethane) is to be phased out is in the Bakery industry under the Bakery Partnership Program. Another step in phasing out the use of R-22 is the import restrictions that begin in 2003, limiting the amount of R-22 that can be imported into the United States.

At the time of this application, the vast majority of residential, window units and freezers in use in the United States contain Refrigerant R-22 (chlorodifluoromethane).

Prior to banning the sale of quantities of Refrigerant R-22 (chlorodifluoromethane), owners of equipment with Refrigerant R-22 (chlorodifluoromethane)-based air-conditioning units are able to purchase the level of refrigerant in their equipment with only the need of a refrigerants license as required by the Clean Air Act. Millions of units containing refrigerant R-22 (chlorodifluoromethane) were sold in the United States prior to the start of mandatory phase out set forth by Congress and the international community.

Refrigerant R-22 (chlorodifluoromethane) recharging typically involves 30 lb. cans or cylinders typically used in the HVAC/R industry. The cylinders are fitted with a dispensing outlet compatible with a commercially available refrigeration manifold. In order to recharge an air-conditioning system, a customer need to only fit the can or cylinder to the manifold and discharge, or “add to” the refrigerant charge directly into the air conditioning system.

Following Congress’s ban on the sale of Refrigerant R-22 (chlorodifluoromethane) millions of equipment owners with Refrigerant R-22 (chlorodifluoromethane)-based air-conditioning units will be left with no choice other than to seek replacement refrigerants to service these units. Intentionally mixing of refrigerants is currently illegal by standards set forth by the Clean Air Act. An example would be for this application is that current R-22 units could not be mixed with this invention intentionally.

In response to Congress’s ban on the use of Refrigerant R-22 (chlorodifluoromethane) in air-conditioning, service dealers have begun to retrofit existing Refrigerant R-22 (chlorodifluoromethane)-based air-conditioning units with new, non-R-22 refrigerants, such as R410A (a 50/50 mixture of difluoromethane and pentafluoroethane), R417 (a 46/50/4 mixture of pentafluoroethane, 1,1,1,2-

tetrafluoroethane, and butane) or R407C (a 23/25/52 mixture of difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane). None of these replacements contain a lubricant when produced.

5 The refrigerants that will be authorized by the Environmental Protection Agency (EPA) to replace Refrigerant R-22 (chlorodifluoromethane) in air conditioners is currently under review and will evolve to require an environmentally safe refrigerant, with a 0 ODP factor like the one of the present invention described herein. Unfortunately, most replacements for R-22 have a markedly different temperature-pressure relationship at most operating temperatures than Refrigerant R-22 (chlorodifluoromethane).

10 Because of this difference in the temperature-pressure relationship of Refrigerant R-22 (chlorodifluoromethane) and current replacement refrigerants, existing Refrigerant R-22 (chlorodifluoromethane)-based systems cannot typically be interchanged. Hence, non-retrofitted, Refrigerant R-22 (chlorodifluoromethane)-based units have a need for a refrigerant that will fulfill the requirements of the system design while also meeting the  
15 requirements of the EPA and the international community.

Simply mixing refrigerants with existing Refrigerant R-22 (chlorodifluoromethane) in order to replenish, or “topping off” the level is against the law and not feasible. When other refrigerants are mixed with Refrigerant R-22 (chlorodifluoromethane), the mixture can take on the pressure characteristics of a  
20 substance that could be harmful to either the equipment or the operator. The temperature-pressure relationship becomes markedly different from that of Refrigerant R-22 (chlorodifluoromethane) at temperatures within the normal refrigerant operating temperature range and typical use of R-22.

Hence, in the absence of Refrigerant R-22 (chlorodifluoromethane) owners of  
25 equipment with Refrigerant R-22 (chlorodifluoromethane)-based air conditioners face but one choice when the level of their air-conditioning coolant is low: professional service—

at a significant cost—to remove the existing Refrigerant R-22 (chlorodifluoromethane), and retrofit the system compatible with some kind of refrigerant gas.

R-22 refrigerants were developed to replace the prior, now banned R-12 refrigerant, or dichlorodifluoromethane. R-12 is sometimes referred to as FREON 12®,  
5 which is a trademark of E.I. du Pont de Nemours & Co. for dichlorodifluoromethane.

Thomas et al. (U.S. Pat. No. 5,254,280) discloses a lubricant developed for use with a refrigerant known as R134a (1,1,1,2 – tetrafluoroethane) and the combination of that lubricant with a refrigerant, which is a replacement for R-12. The lubricant contains polyoxyalkylene glycol, which is hydrophilic and could damage the system as discussed  
10 below.

Wilczek (U.S. Pat. No. 5,384,057), Gorski (U.S. Pat. No. 4,971,712), and Anton of DuPont (U.S. Pat. No. 5,145,594) disclose other R-12 replacements in the form of a blend of certain synthetic lubricants in various R134a and R134a/R125 refrigerant systems. The DuPont patents discuss a gas known as R125 (pentafluoroethane). R125 is  
15 five fluorine atoms bonded to an ethane molecule. This is a very large molecule for a refrigerant. It is currently being produced for refrigeration only. Anton discloses the use of a lubricant comprising at least one cyanocarbon compound. Wilczek discloses a fluorosiloxane as a lubricant. Gorski discloses a polyalkylene glycol as a lubricant.

Systems that contain R-22, or R-12 replacements, are still being produced today.  
20 These older systems have common components: R-22, R-22 mineral oil lubricant, and water that is sequestered into the dryer. If R134a (1,1,1,2-tetrafluoroethane) were added to the system, it would damage the system as follows: (1) if no lubricant is added to the R134a (as in U.S. Pat. No. 4,953,312 to Tamura et al.), then the R-22 system would be starved for lubricant, since the R134a gas is not miscible with the mineral oil lubricant;  
25 (2) if a synthetic lubricant is added to the R134a (as in Thomas et al.), then there is a different problem—that of moisture. Older systems can have water trapped in their dryers. The synthetic lubricants (such as polyglycol- or polysiloxane-based lubricants)

are hydrophilic. Thus, they are not only miscible with R-22 and R134a; they are also partially or completely miscible with water. Thus, if they are introduced into an R-22 system, they will pull this water out of the dryer into the refrigerant flow, initiating corrosion and damage to pressure switches and the TX valve and possible other system components. This is why Elf Atochem and DuPont, to name a few publish elaborate flushing procedures and high efficiency dryer change-outs to prevent damage to the cooling system.

Weber (U.S. Patent No. 5,942,149) discloses yet another R-12 replacement consisting of a blend of chlorodifluoroethane, tetrafluoroethane and a naphthenic lubricating oil.

### **SUMMARY OF THE PRESENT DISCLOSURE**

The present disclosure is of a method and apparatus that are environmentally sound alternatives to the use of Refrigerant R-22 (chlorodifluoromethane) as a refrigerant. More particularly, the invention provides a mixture of at least two refrigerants that are miscible with each other, and compatible with Refrigerant R-22 (chlorodifluoromethane) while at the same time possessing a temperature-pressure profile that approximates that of Refrigerant R-22 (chlorodifluoromethane) over the operating range of ambient temperatures usually encountered by air conditioning units or other apparatus utilizing Refrigerant R-22 (chlorodifluoromethane) as a refrigerant. The invention also provides a lubricant, that is compatible with both the environmentally sound refrigerant of the invention and with Refrigerant R-22 (chlorodifluoromethane), so that mixtures of the refrigerant according to the invention and Refrigerant R-22 (chlorodifluoromethane) may be utilized with this lubricant in the refrigeration systems without deleterious effect upon moving parts of the refrigerating apparatus that require lubrication from the refrigerant.

More particularly, the refrigerant and method disclosed herein involves a mixture of pentafluoroethane and tetrafluoroethane in specific proportions that provide a



temperature-pressure relationship that approximates that of Refrigerant R-22 (chlorodifluoromethane) over the range of ambient temperature operating conditions in which Refrigerant R-22 (chlorodifluoromethane) is a useful refrigerant. The pentafluoroethane/tetrafluoroethane refrigerant blend disclosed herein is compatible with  
5 both synthetic and mineral oils. The tetrafluoroethane can be either 1,1,1,2-tetrafluoroethane or 1,1,2,2-tetrafluoroethane. In an exemplary embodiment, the refrigerant according to the invention comprises a ratio of from about 40 to about 45 weight percent pentafluoroethane to about 55 to about 60 percent 1,1,1,2-tetrafluoroethane, based upon the total weight of pentafluoroethane and 1,1,1,2-  
10 tetrafluoroethane. In a further exemplary embodiment, the refrigerant includes the ratio of about 42 weight percent pentafluoroethane to about 58 weight percent 1,1,1,2-tetrafluoroethane.

In addition, the refrigerant according to the invention also includes from about 0 to about 20 weight percent (based on the combined weight of pentafluoroethane and  
15 1,1,1,2-tetrafluoroethane) of a lubricating oil that is soluble in chlorodifluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane. In a preferred embodiment the lubricating oil is present in the range of from about 0.5 to about 2% by weight of the refrigerant mixture.

In an exemplary embodiment, the lubricating oil is a napthenic or paraffinic based  
20 lubricating oil. In a further exemplary embodiment, the lubricant is selected from those lubricants sold by Anderol, Inc., East Hanover, N.J., an affiliate of Royal Lubricants Company, under the trademark ROYCO® 2302. ROYCO® 2302 is a napthenic oil lubricant having the following composition:

65-85% hydrotreated light napthenic distillate,  
25 10-20% solvent refined light napthenic distillate petroleum,  
<0.5% butylated triphenyl phosphate, and  
<2% minor additive.

In another exemplary embodiment, the lubricating oil can be a synthetic lubricating oil, or a mixture of oils, that is soluble in the mixture of the chlorodifluoroethane and tetrafluoroethane. A suitable synthetic lubricant is a man-made, synthetic alkyl aromatic lubricant. Suitable synthetic lubricants include alkylated  
5 benzene lubricants.

The lubricant can be either a synthetic alkyl aromatic lubricant, such as alkylbenzene, alone, or a mixture of a synthetic alkyl aromatic lubricant and mineral oil or a mixture of a synthetic alkyl aromatic lubricant and polyol ester (POE). When so mixed, it is preferred, but not required, that a minor portion of the mixture be mineral oil  
10 or POE. By minor portion, we mean less than 50% by weight of the blended refrigerants. Alternatively, either mineral oil or polyol ester (POE) can be used alone.

While it is intended that the substitute refrigerant according to the invention may be utilized to replace Refrigerant R-22 (chlorodifluoromethane) that has escaped from apparatus, the substitute refrigerant of the invention may also be utilized to completely  
15 refill apparatus that have been designed for use with Refrigerant R-22 (chlorodifluoromethane), since the refrigerant has a temperature-pressure profile that closely approximates that of Refrigerant R-22 (chlorodifluoromethane). Thus, when the refrigerant is used as a complete replacement for Refrigerant R-22 (chlorodifluoromethane), it is no longer necessary that the lubricant be compatible with  
20 chlorodifluoromethane but only that it should be compatible with 1,1,1,2-tetrafluoroethane and pentafluoroethane.

Further, whereas the substitute refrigerant of the invention is less damaging to the ozone layer than Refrigerant R-22 (chlorodifluoromethane) and is useful in air conditioning units, and in particular residential type air-conditioning units, it is not so  
25 limited in its use. Indeed, the refrigerant may be utilized as a substitute or replacement for Refrigerant R-22 (chlorodifluoromethane) in virtually any application, thereby eliminating the use of ozone layer-damaging Refrigerant R-22 (chlorodifluoromethane).

In further specifics, the invention provides a canister containing a mixture of tetrafluoroethane and pentafluoroethane with a napthenic oil that may be fitted with an outlet manifold that is compatible with a Refrigerant R-22 (chlorodifluoromethane) recharging manifold that is typically used to recharge an apparatus with the latter  
5 refrigerant. Refrigerant may then be allowed to flow from the container through the manifold and into the apparatus to replace Refrigerant R-22 (chlorodifluoromethane) refrigerant that has been lost from the refrigeration system.

When mixing the components of the refrigerant blend of the present invention, one should first mix the lubricant with the tetrafluoroethane, then mix that mixture with  
10 the pentafluoroethane in the proportions afore mentioned. Otherwise, the product does not mix properly.

In an exemplary form, the lubricant has a viscosity of 5 to 500 centistokes, more preferably 5 to 100 centistokes, even more preferably 5 to 50 centistokes, and most preferably 5 to 10 centistokes. The lubricant having a viscosity of 5 to 10 centistokes is  
15 preferred.

In an exemplary embodiment, the percentage by weight of lubricant in the refrigerant blend is 0-20%, preferably 0.5-2%, more preferably 1-2%, even more preferably 1.25-2%, and most preferably 1.5-1.75%. The percentage by weight of lubricant in the refrigerant blend is, for example, 1.75.  $\pm$  0.05%.

20 A suitable lubricant is severely hydro treated napthenic/paraffinic lubricant, such as the aforementioned ROYCO® 2302. Other suitable lubricants include Sunpar R2280 (a paraffinic based lubricant), Lubrizol 403, Sunthene 200 (a napthenic based lubricant) and L30 or L35 from Shrieve Chemical Company, The Woodlands, Texas, or Zerol 150 from Nu-Calgon Wholesale, Inc., St. Louis, Missouri, or AB150 from Virginia KMP  
25 Corporation, Dallas, Texas (alkylbenzene synthetic lubricants). Mobil One 5-weight synthetic oil (it is hydrophobic) could also work as a lubricant, but it is relatively expensive.

In order for the parts of the refrigerant system to function best, 0.5-20% of total weight of refrigerant should be lubricant. When adding the refrigerant blend to a refrigerant system, one should leave the lubricant in the system if one for some reason takes out the Refrigerant R-22.

- 5           The lubricating of the present system is miscible with the pentafluoroethane and tetrafluoroethane blend and with R-22 refrigerant. This allows for mixing of residual R-22 refrigerant and the refrigerant of the present invention, without the release of significant amounts of residual water in the dryer and subsequent system damage (as will happen if the synthetic lubricants disclosed in Thomas et al. and the DuPont patents are used).
- 10       While alkylbenzene alone is considered not miscible with tetrafluoroethane (in particular R134a), it is sufficiently soluble in the present tetrafluoroethane/chlorodifluoroethane mixture. This solubility allows the replacement refrigerant blend to lubricate the system, preventing damage to the compressor and component parts of the system.

- Various optional additives can be included in the lubricant. A corrosion inhibitor
- 15       can be included. (otherwise corrosion will probably occur within 6 months). An exemplary corrosion inhibitor is one for anhydrous systems (such corrosion inhibitors comprise calcium, or phosphate salts). The corrosion inhibitor can be bonded to the lubricant. Additionally, a surfactant and/or a foaming agent can be included.

- The present refrigerant blend is designed to be utilized as a R-22 replacement in
- 20       refrigeration systems. It is designed as a replacement, in which little or no modifications including parts are used to adapt the system for the refrigerant of the present invention.

- The present refrigerant blend can be used as a replacement for R-22 refrigerant, typically deminimus without retrofitting the air conditioning system or flushing it out. It is recommended that a full vacuum be obtained before adding the refrigerant to the
- 25       present invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Many aspects of the disclosure can be better understood with reference to the following drawings.

FIG. 1 illustrates pressure versus temperature profiles for various blends of the present disclosure in comparison to R-22.

FIG. 2 compares the temperature versus enthalpy profile of an exemplary embodiment of the present disclosure to R-22.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The present disclosure provides a mixture of non-Refrigerant 22 refrigerants that are less damaging to the Earth's ozone layer and that are approved by the U.S. Environmental Protection Agency for use in air-conditioners. The invention mixture is compatible with Refrigerant R-22 (chlorodifluoromethane) and can be used to replace existing Refrigerant R-22 (chlorodifluoromethane)-in R-22 based refrigeration systems. It is expected that the present invention will gradually replace Refrigerant R-22 (chlorodifluoromethane) in Refrigerant R-22 (chlorodifluoromethane)-based air-cooling systems, without the need to retrofit existing Refrigerant R-22 (chlorodifluoromethane)-based systems for non-Refrigerant 22 replacement refrigerants.

Specifically, the present refrigerant blend includes a mixture of pentafluoroethane and tetrafluoroethane packaged with a compatible lubricating oil, provided under pressure in a can or cylinder equipped with an outlet compatible with existing Refrigerant R-22 (chlorodifluoromethane) recharging kit manifolds, so that the refrigerant and lubricant mixture can be added to existing Refrigerant R-22 (chlorodifluoromethane) based coolant systems. Also, the invention provides the possibility of using new refrigerant systems, originally designed for "Refrigerant R-22 (chlorodifluoromethane)," by supplying an EPA-approved refrigerant so that retrofitting to new equipment use is not required.

In an exemplary embodiment, the invention provides a cylinder can like the standard 25 or 30 lb. can formerly used for containing "Refrigerant R-22 (chlorodifluoromethane)," but containing about 58% by weight 1,1,1,2-tetrafluoroethane and about 42% by weight pentafluoroethane. The can also contains the preferred  
5 lubricant, ROYCO® 2302 in solution with the coolant mixture at a percent by weight of between 0.5% and 2%.

Existing Refrigerant R-22 (chlorodifluoromethane)-based air-conditioning systems use an amount of a vegetable or hydrocarbon mineral oil to lubricate the compressor. This oil has a very low vapor pressure, and is not soluble with pure  
10 tetrafluoroethane, particularly 1,1,1,2-tetrafluoroethane. Hence, adding tetrafluoroethane to replace Refrigerant R-22 (chlorodifluoromethane) in existing Refrigerant R-22 (chlorodifluoromethane)-based air-conditioning systems leads to compressor breakdown from lack of sufficient lubrication. The invention provides lubricants that are compatible with the invention mixture of tetrafluoroethane and pentafluoroethane, and with  
15 "Refrigerant R-22 (chlorodifluoromethane)," and that are suitable for lubricating refrigerant compressors and other air-conditioner component parts. The lubricants disclosed herein, on the other hand, are soluble in a tetrafluoroethane/ pentafluoroethane mixture. This solubility allows the replacement refrigerant blend to lubricate the air-conditioning system, preventing damage to the compressor and component parts of the  
20 system.

#### EXAMPLE 1

Table 1 summarizes the results of solubility tests of a 2% by weight solution of ROYCO® 2302 oil lubricant in an 58/42% by weight mixture of 1,1,1,2-tetrafluoroethane and pentafluoroethane refrigerants. ROYCO® 2302 oil (available from  
25 ANDEROL®, Inc., an affiliate of Royal Lubricants Co.), was added to a clear Fisher-Porter pressure burette and a mixture of 1,1,1,2-tetrafluoroethane/pentafluoroethane in an 58/42 ratio by weight was introduced under pressure to maintain the liquid state.

TABLE 1

	Full Burette	clear no separation
	2/3 Full Burette	clear no separation
5	1/2 Full Burette	clear no separation
	1/3 Full Burette	clear no separation
	Almost Empty Burette	clear no separation

Note: The color of the fluid remained the same as the burette was emptied. The expelled  
 10 gas deposited the oil onto a test panel.

## EXAMPLE 2

1,1,1,2-tetrafluoroethane and pentafluoroethane are mixed with the napthenic oil  
 lubricant at set ratios such that the temperature-pressure profile of the mixture is similar  
 to that of Refrigerant R-22 (chlorodifluoromethane), over the normal operating range of  
 15 air-conditioners. Table 2 summarizes the results of tests of the temperature-pressure  
 profiles of various mixes of 1,1,1,2-tetrafluoroethane and pentafluoroethane over the  
 range of normal air-conditioner working temperatures, from -60 degree. F. to 160.  
 degree. F.

For Table 2, different percentages of 1,1,1,2-tetrafluoroethane and  
 20 pentafluoroethane --by weight--were mixed with the lubricant to show the pressure  
 temperature relationships of the various invention combinations.

Fig. 1 shows Pressure (liquid) vs. Temperature profiles for R-22 and blends of  
 40/60, 45/55 and 42/58 of tetrafluoroethane and pentafluoroethane, respectively.

Fig. 2 shows Temperature vs. Enthalpy profiles comparing a blend of 40/60  
 25 tetrafluoroethane and pentafluoroethane to R-22.

The blend of refrigerants tetrafluoroethane and pentafluoroethane of the present  
 disclosure shows the following properties of interest:

Dew Point @ -32F

Bubble Point @ -41.5F

Glide @ 9.5 F

5 An exemplary blend of refrigerants is about 42% by weight pentafluoroethane and about 58% by weight 1,1,1,2-tetrafluoroethane. This is the ratio of pentafluoroethane to 1,1,1,2-tetrafluoroethane with the lubricant where the mixture of the invention shows the greatest similarity to "Refrigerant R-22 (chlorodifluoromethane)", over most operating temperatures.

10 The apparatus and method of the preferred embodiment encompass the use of a mixture of 1,1,1,2-tetrafluoroethane and pentafluoroethane at the ranges, as discussed above, with a lubricating oil at ranges, as discussed above of about 0.5% to about 2% by weight in the operation of an air-conditioning system, wherein the coolant-oil mixture replaces Refrigerant R-22 (chlorodifluoromethane) in a Refrigerant R-22 (chlorodifluoromethane)-based refrigeration system.

15 The method and apparatus in the preferred embodiment further details providing the above described mix of pentafluoroethane/1,1,1,2-tetrafluoroethane and lubricating oil in 30 lb. cylinders, where the cylinders are pressure sealed and fitted with an outlet compatible for existing Refrigerant 22-type refrigeration manifolds typically ¼ inch male flare.

20 Further, it was noted that the systems tested ran more smoothly and the compressor showed less vibration during the test period, as the mixture of the invention was added. It is theorized that the lubricating oil, being soluble in the refrigerant gasses, was better able to lubricate the compressor and reciprocating parts than the existing Refrigerant R-22 (chlorodifluoromethane) lubricant used by itself. In some applications a  
25 reduction in power consumption maybe also noted.



The refrigerant of the present invention can also be used as a replacement refrigerant for the new R-22 air-conditioning systems, such as the systems used in today's HFC-free units

5 The ROYCO® 2302 napthenic oil lubricant of the present disclosure has a flash point of more than 150 degrees F. Pure refrigerant 1,1,1,2-tetrafluoroethane is not miscible with a napthenic lubricant like mineral oil or mineral seal oil (both of which could be used as the lubricants of the present invention). Pentafluoroethane is miscible with most napthenic lubricants, including mineral oils. The presence of the pentafluoroethane allows the use of mineral oils in the refrigerant blend and system of the present invention (a translucent, partially miscible blend is formed). The lubricant can  
10 advantageously be partially polymerized into longer chain molecules to allow it to function at very low percentage levels. The lubricant can be hydrotreated or polymerized for stability and wear resistance.

Phosphated additives add corrosion resistance in the presence of acids and salts  
15 and increase wear resistance. Calcium additives help the lubricant resist rust and the effects of corrosion; calcium salts reduce the corrosive effects of hydrochloric acid that is formed in the presence of water and the chlorinated gases present in the refrigerant systems of the present invention.

The ROYCO® lubricants mentioned above contain the corrosion inhibitors  
20 mentioned above and can also contain acrylic polymer. It is believed that the function of the acrylic polymer is to increase wear resistance under severe conditions. Acrylics can help film formation, and the ability of the lubricant to coat metal and soft parts and stay in place.

The lubricant of the present invention is miscible with R-22, the R-22 lubricant,  
25 and the blend of the refrigerant gases of the present invention.

It should be understood that variations and modifications may be made of the invention herein taught, and that those are within the scope and spirit of the invention as taught above and claimed here below.

Table 2

Temp (F)	P (60-40)	P (58-42)	P (55-45)	P (R-22)
-60	8.982	8.81	8.552	8.836
-55	10.36	10.16	9.87	10.19
-50	11.9	11.68	11.35	11.7
-45	13.62	13.37	12.99	13.39
-40	15.52	15.24	14.82	15.26
-35	17.63	17.32	16.84	17.34
-30	19.96	19.61	19.08	19.62
-25	22.52	22.13	21.54	22.14
-20	25.33	24.9	24.25	24.91
-15	28.41	27.93	27.21	27.93
-10	31.76	31.23	30.44	31.23
-5	35.42	34.83	33.96	34.82
0	39.39	38.74	37.79	38.73
5	43.69	42.98	41.94	42.96
10	48.34	47.57	46.43	47.54
15	53.36	52.52	51.27	52.48
20	58.76	57.85	56.5	57.79
25	64.57	63.58	62.11	63.51
30	70.8	69.73	68.14	69.65
35	77.48	76.33	74.61	76.22
40	84.62	83.38	81.52	83.26
45	92.25	90.9	88.91	90.76
50	100.4	98.93	96.79	98.76
55	109	107.5	105.2	107.3
60	118.2	116.6	114.1	116.3
65	128	126.2	123.6	125.9
70	138.4	136.5	133.6	136.1
75	149.3	147.3	144.3	146.9
80	160.9	158.8	155.6	158.3
85	173.2	170.9	167.5	170.4
90	186.1	183.7	180.1	183.1
95	199.8	197.2	193.3	196.5
100	214.2	211.4	207.3	210.6
105	229.3	226.4	222.1	225.5
110	245.3	242.2	237.6	241.1
115	262	258.7	253.9	257.5
120	279.6	276.1	271	274.7
125	298.1	294.4	289	292.7
130	317.5	313.6	307.8	311.6
135	337.8	333.7	327.6	331.4
140	359.1	354.8	348.3	352.1
145	381.4	376.8	370.1	373.7
150	404.8	400	392.8	396.4
155	429.3	424.2	416.7	420
160	454.9	449.5	441.6	444.7

FIG. 1

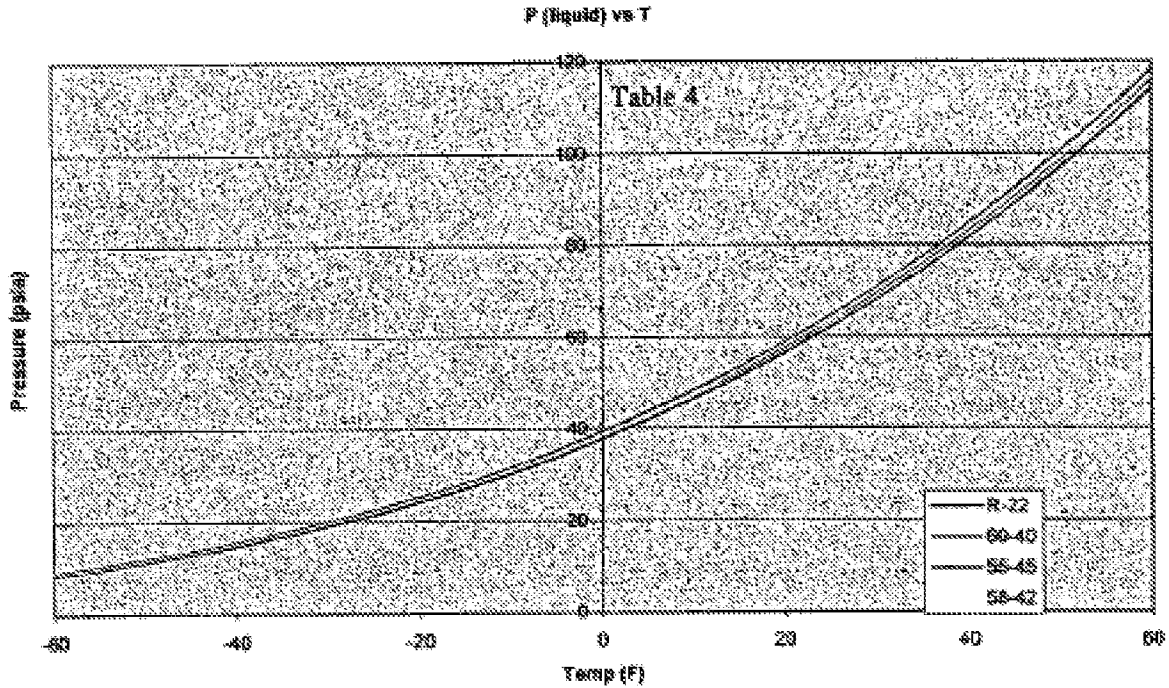
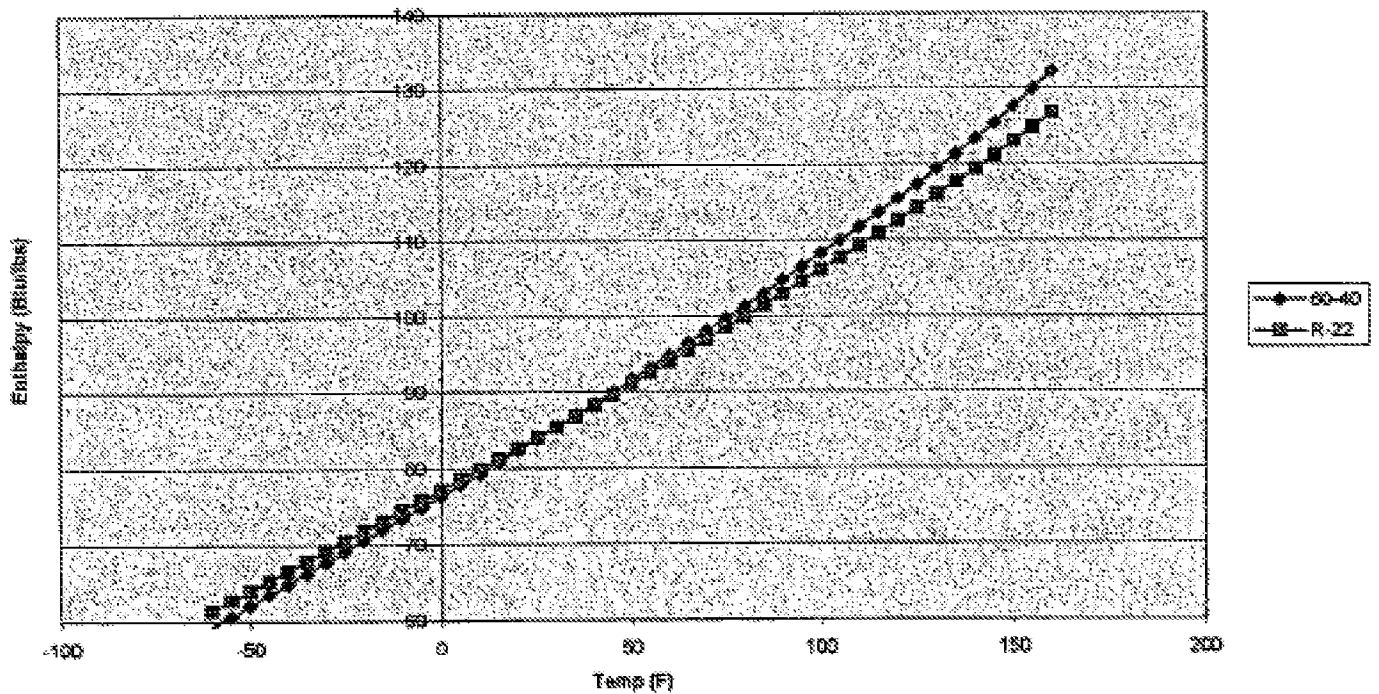


FIG. 2  
Temp vs Enthalpy



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	32727944
<b>Application Number:</b>	15989655
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5897
<b>Title of Invention:</b>	REFRIGERATION WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
<b>First Named Inventor/Applicant Name:</b>	Kenneth M. PONDER et al.
<b>Customer Number:</b>	24504
<b>Filer:</b>	Todd Deveau./Sheila Gray
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<b>Attorney Docket Number:</b>	821920-1033
<b>Receipt Date:</b>	25-MAY-2018
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<b>Time Stamp:</b>	13:40:20
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1256311	no	9
			fce350914ed82380cb051fb0c1debb50cb223a96		

### Warnings:

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Information:					
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Abstract		22	22	
	Claims		18	21	
	Specification		1	17	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Final_Drawings.pdf	367262	no	1
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