

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Kenneth M. Ponder, et al.

Confirmation No.: Unknown

Group Art Unit: Unknown

Serial No.: Concurrently Filed Herewith

Examiner: Unknown

Filed: June 11, 2012

Docket No.: 821920-1032

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 Applicant submits the following preliminary amendment 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

Amend the title as follows:

~~ENVIRONMENTALLY SAFER REPLACEMENT REFRIGERANT WITH NAPHTHENIC
LUBRICATING OIL FOR REFRIGERANT REPLACEMENT OF R22-BASED REFRIGERATION
SYSTEMS-REFRIGERANT~~

Amend the specification as follows:

Page 1, line 6 replace with:

This application 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 provisional application, Serial No. 60/501,049 filed September 8, 2003.

Page 11, line 19 replace with:

In an exemplary embodiment, the invention provides ~~[[an]]~~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 lubricant, ROYCO® 2302 in solution with the coolant mixture at a percent by weight of between 0.5% and 2%.

Page 13, line 13 replace with:

Fig. 1 shows Pressure (liquid) vs. Temperature profiles for R-22 and blends of ~~60/40, 55/45 and 58/42~~ 40/60, 45/55 and 42/58 of tetrafluoroethane and pentafluoroethane, respectively.

Fig. 2 shows Temperature vs. Enthalpy profiles comparing a blend of ~~60/40~~ 40/60 tetrafluoroethane and pentafluoroethane to R-22.

IN THE CLAIMS

Please amend the claims to read as follows wherein changes are shown by strikethrough for deleted matter and underlining for added matter.

1 - 29.(Cancelled)

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 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.

31. (New) In the apparatus of claim 30, wherein the blend exhibits a dew point at about -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 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

(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. (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.

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 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.

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.

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 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 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.

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-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.
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.
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.

REMARKS

Applicant has amended the specification, relating to the priority claim and Figs. 1 and 2, and encloses a Substitute Specification. It is believed that the foregoing amendment adds no new matter to the present application.

Applicant respectfully requests that this application and all presently pending claims be allowed to issue. If the Examiner has any questions or comments regarding Applicant's response, the Examiner is encouraged to telephone Applicant's undersigned counsel.

Respectfully submitted ,

**THOMAS, KAYDEN, HORSTEMEYER
& RISLEY, L.L.P.**

By: /Todd Deveau/
Todd Deveau, Reg. No. 29,526

400 Interstate North Parkway SE
Suite 1500
Atlanta, Georgia 30339
(770) 933-9500

Docket No. 821920-1032

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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-

SUBSTITUTE SPECIFICATION

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—

SUBSTITUTE SPECIFICATION

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)

SUBSTITUTE SPECIFICATION

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

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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).

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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:

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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 naphthenic 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 naphthenic 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 naphthenic lubricants, including mineral oils. The presence of the pentafluoroethane allows the use of mineral oils in the refrigerant blend and system of the
10 present invention (a translucent, partially miscible blend is formed). The lubricant can 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.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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

SUBSTITUTE SPECIFICATION

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,

SUBSTITUTE SPECIFICATION

(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.

SUBSTITUTE SPECIFICATION

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.
- 10 38. (New) In the apparatus of claim 30, wherein the lubricating oil includes an additive selected from the group consisting of an acrylic polymer, a corrosion inhibitor, a surfactant, a foaming agent, and mixtures thereof.
- 15 39. (New) The method according to claim 32, wherein the apparatus is selected from the group consisting of refrigeration equipment, air-conditioning equipment, and HVAC equipment.
- 20 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.
41. (New) In the apparatus of claim 30, wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane.
- 25 42. (New) The method of claim 32, wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane.
43. (New) The refrigerant composition of claim 34, wherein the tetrafluoroethane is 1,1,1,2-tetrafluoroethane.

SUBSTITUTE SPECIFICATION

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.

SUBSTITUTE SPECIFICATION

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
5 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
10 which is compatible with both the unit refrigerant and typical R-22 system design.



RX TIME 12/22/04 14:40

LOCATION: 7707770599

DECLARATION FOR PATENT APPLICATION

Attorney Docket No: 821920-1030

As the below named inventor(s), I/we hereby declare that:

Our residences, post office addresses and citizenships are as stated below next to our names.
We believe we are the original, first, and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **Environmentally Safer Replacement Refrigerant with Napthenic Oil for Refrigerant R22-Based Refrigeration Systems**, the specification of which:

☐ is attached hereto.
☒ was filed on September 8, 2004 as Application Serial No. 10/937,736.
☐ was filed on _____ under U.S. Express Mail No. _____.
☐ is set forth in PCT International Application No. _____;
filed on _____ and as amended Under PCT Article 19 on _____ (if any).

I/we hereby state that I/we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I/we acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I/we hereby claim foreign priority benefits under Title 35, United States Code, 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America listed below and have also identified below any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed: **NOT APPLICABLE**.

I/we hereby appoint all attorneys and agents of Thomas, Kayden, Horstemeyer & Risley, LLP, who are listed under the USPTO Customer Number shown below as my/our attorneys and agents to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, recognizing that the specific attorneys and agents listed under that Customer Number may be changed from time to time at the sole discretion of Thomas, Kayden, Horstemeyer & Risley, LLP, and request that all correspondence be addressed to the address filed under the same USPTO Customer Number.

24504

Please address all telephone calls, in the first instance, to **Todd Deveau**
(770) 933-9500.

at telephone number:

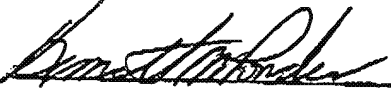
Address all correspondence to:

Todd Deveau
THOMAS, KAYDEN, HORSTEMEYER
& RISLEY, L.L.P.
100 Galleria Parkway, N.W., Suite 1750
Atlanta, Georgia 30339-5948

Page 1 of 3

Docket No. 821920-1030

I/we hereby declare that all statements made herein of my/our 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 statement 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.

Full Name of First Inventor: Kenneth M PonderResidence: 105 Highland View Drive, Cumming, Georgia 30040 US Citizenship: USPost Office Address: 105 Highland View Drive, Cumming, Georgia 30040 USInventor's Signature: Date: 12/22/04

Page 2 of 3

Full Name of Second Inventor: Steffan Thomas, Jr.
Residence: 4250 Bethany Road, Buckhead, Georgia US Citizenship: US
Post Office Address: 4250 Bethany Road, Buckhead, Georgia US

Inventor's Signature: Steffan Thomas, Jr. Date: 12/22/04

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Kenneth M. Ponder, et al.

Confirmation No.: Unknown

Group Art Unit: Unknown

Serial No.: Concurrently Filed Herewith

Examiner: Unknown

Filed: June 4, 2012

Docket No.: 821920-1032

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, and specifically:

☒ under 37 CFR 1.97(b), or
(within Three months of filing national application; or date of entry of international application;
or before mailing date of first office action on the merits; whichever occurs last)

☐ under 37 CFR 1.97(c) together with either a:
☐ Statement Under 37 C.F.R. 1.97(e), or
☐ a \$180.00 fee under 37 CFR 1.17(p).
(After the CFR 1.97(b) time period, but before the final office action or notice of allowance, whichever occurs first)

☐ under 37 CFR 1.97(d) together with a:
☐ Statement under 37 CFR 1.97(e), and
☐ a \$180.00 petition fee set forth in 37 CFR 1.17(p).
(Filed after final office action or notice of allowance, whichever occurs first, but before payment of the issue fee)

☐ Enclosed is a check in the amount of \$_____.

☐ Payment by credit card.

☐ Please charge \$180.00 to deposit account 20-0778.

☒ At any time during the pendency of this application, please charge any fees required to Deposit Account 20-0778 pursuant to 37 CFR 1.25. The Commissioner is hereby requested to credit any overpayment to Deposit Account No. 20-0778.

☒ Applicant(s) submit herewith *Form PTO SB/08A-08B-08a - Information Disclosure Statement by Applicant* together with copies (where required) of patents, publications or other information of which

applicant(s) are aware, which applicant(s) believe(s) may or may not be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56. As required by 37 C.F.R. §1.98(a), a legible copy of each document is provided.

- ☐ A concise explanation of the relevance of foreign language patents, foreign language publications and other foreign language information listed on PTO Form SB/08A-08B-08a, as presently understood by the individual(s) designated in 37 CFR 1.56(c) most knowledgeable about the content is given on the attached sheet, or where a foreign language patent is cited in a search report or other action by a foreign patent office in a counterpart foreign application, an English language version of the search report or action which indicates the degree of relevance found by the foreign office is listed on the form PTO SB/08A-08B-08a and is enclosed herewith.

The following rights are reserved by the Applicant(s): the right to establish the patentability of the claimed invention over any of the listed documents should they be applied as reference, and/or 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. Any statements or identifications regarding the relevance of any portion(s) of cited references should not be construed as a representation that the most relevant portion(s) have been identified, and the absence of such statements or identifications should not be construed as representations that there are no relevant portion(s). 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 requested that the information disclosed herein be made of record in this application and that the Examiner initial and return a copy of the enclosed PTO SB/08A-08B-08a to indicate the documents have been considered.

Respectfully submitted,

**THOMAS, KAYDEN, HORSTEMEYER
& RISLEY, LLP**

By: /Todd Deveau/
Todd Deveau
Registration No. 29,526

400 Interstate North Parkway SE
Suite 1500
Atlanta, Georgia 30339
Phone: 770.933.9500
Email: todd.deveau@tkhr.com

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		2012-06-11
	First Named Inventor	Kenneth M. Ponder	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	821920-1032	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6207071		2001-03-27	Takigawa 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 ¹	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 ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							☐

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 ⁵

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

Application Number		
Filing Date		2012-06-11
First Named Inventor	Kenneth M. Ponder	
Art Unit		
Examiner Name		
Attorney Docket Number		821920-1032

	1		☐
--	---	--	--------------------------

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.

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

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

Application Number	
Filing Date	2012-06-11
First Named Inventor	Kenneth M. Ponder
Art Unit	
Examiner Name	
Attorney Docket Number	821920-1032

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)	2012-06-11
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.

Electronic Acknowledgement Receipt

EFS ID:	12983192
Application Number:	13493491
International Application Number:	
Confirmation Number:	1039
Title of Invention:	REFRIGERANT WITH LUBRICATING OIL FOR REPLACEMENT OF R22 REFRIGERANT
First Named Inventor/Applicant Name:	Kenneth M. Ponder
Customer Number:	24504
Filer:	Todd Deveau./Amy Kwon
Filer Authorized By:	Todd Deveau.
Attorney Docket Number:	821920-1032
Receipt Date:	11-JUN-2012
Filing Date:	
Time Stamp:	16:06:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	01634576.PDF	1034573 3057784572232480c653d882a6e5a2682307fd31	no	5

Warnings:

Information:

2	Drawings-only black and white line drawings	01634562.PDF	361092	no	1
			2b8a8a4b22c2af16be51ace5dc528420c19c092f		
Warnings:					
Information:					
3		01640914.PDF	149245	yes	23
			2a2beceda6c0413b319a7d3498b8b4113ba18507		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	16	
	Claims		17	22	
	Abstract		23	23	
Warnings:					
Information:					
4	Preliminary Amendment	01640932.PDF	80959	no	7
			d2e1fc3c80f4a7740adfb8de19d3d03e396649a2e		
Warnings:					
Information:					
5		01640938.PDF	150784	yes	22
			d0bfecfc4edae5b598374c7375e2c22ae06bca75		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	17	
	Claims		18	21	
	Abstract		22	22	
Warnings:					
Information:					
6	Oath or Declaration filed	01640227.PDF	103242	no	3
			4be25c7c87b9ccce89c5e1254e31435429ce6806		
Warnings:					
Information:					