

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 295 928 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.03.2003 Bulletin 2003/13

(51) Int Cl.7: **C09K 5/04, C10M 171/00**

(21) Application number: **01310350.2**

(22) Date of filing: **11.12.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

- **Pham, Hang T**
Amherst, New York 14228 (US)
- **Wilson, David P**
East Amherst, New York 14051 (US)
- **Metcalf, David A.**
Whippany, New Jersey 07981 (US)

(30) Priority: **21.09.2001 US 960217**

(71) Applicant: **Honeywell International, Inc.**
Morristown, New Jersey 07962 (US)

(74) Representative: **Hucker, Charlotte Jane**
Gill Jennings & Every
Broadgate House,
7 Eldon Street
London EC2M 7LH (GB)

(72) Inventors:
• **Singh, Rajiv R**
Getzville, New York 14068 (US)

(54) **Hydrofluorocarbon refrigerant compositions soluble in lubricating oil**

(57) The present invention provides hydrofluorocarbon compositions suitable for use in a wide range of applications. The compositions of the present invention tend to be soluble in hydrocarbon lubricating oils, and

thus, are especially useful in replacing CFC and HCFC compositions in refrigeration applications.

EP 1 295 928 A2

Description**FIELD OF INVENTION**

5 **[0001]** The present invention relates generally to hydrofluorocarbon refrigerant compositions. More specifically, the present invention relates to hydrofluorocarbon refrigerant compositions that are soluble in lubricant oils used traditionally with chlorine-containing refrigerants, and are useful as replacements for chlorine-containing refrigerants.

BACKGROUND OF THE INVENTION

10 **[0002]** Hydrofluorocarbons ("HFCs") are of particular interest for use as replacements for chlorine-containing refrigerants, such as chlorofluorocarbon ("CFC") and hydrochlorofluorocarbon ("HCFC") refrigerants. As used herein, the term "refrigerant" refers generally to a compound or a composition of compounds which, in a mechanical system, are compressed and condensed to reject heat into the environment and expanded and evaporated to absorb heat from the environment. These compounds generally have good latent heat of evaporation, good heat transfer coefficients, good stability, little effect on elastomers and plastics used in mechanical equipment, reasonable compression ratios, good solubility in lubricating oils used to lubricate moving parts, and non-flammability.

15 **[0003]** Of particular interest in this application is the refrigerant's solubility and its non-flammability. The HFC refrigerant must be soluble in the lubricant over a wide range of operating temperatures to lower the viscosity of the lubricant and allow it to flow more easily throughout the system. In the absence of such solubility, lubricants tend to become lodged in the coils of the refrigeration system evaporator, as well as other parts of the system, and thus reduce the system efficiency.

20 **[0004]** The applicants have come to appreciate that it is particularly advantageous for replacement HFC refrigerants to be not only soluble in lubricants in general, but to be soluble in the particular types of conventional lubricants used with CFC refrigerants. As used herein, the term "conventional lubricants" refers generally to lubricants which are known to be relatively soluble and/or miscible with known CFC refrigerants. Examples of commonly used and commercially available conventional lubricants include mineral or hydrocarbon oil, alkyl benzene oil, white or paraffinic oil, and mixtures of two or more thereof.

25 **[0005]** A primary advantage of an HFC replacement refrigerant being soluble in a conventional lubricant is the ability to continue to use the new refrigerants with such lubricants which tend to be relatively inexpensive and commercially available. Accordingly, the use of soluble HFC refrigerants with conventional lubricants allows for the formulation of environmentally-friendly refrigeration systems at a relatively low cost.

30 **[0006]** Another advantage of lubricant-soluble HFC refrigerants is their ability to be installed in existing CFC-containing refrigeration systems without the need to remove the lubricant oil from the system. By leaving the existing lubricant behind and recharging the system with just refrigerant, significant savings in time and cost can be realized.

35 **[0007]** Countering the desire for lubricant-soluble refrigerants is the need to produce non-flammable compositions. Applicants have come to appreciate that solubility and flammability are often competing requirements since components of a composition which tend to increase solubility with lubricants oils also tend to increase the flammability of such compounds.

40 **[0008]** Therefore, there is a need for an HFC refrigerant that is not only sufficiently soluble in conventional lubricants, but also non-flammable.

DETAILED DESCRIPTION OF THE INVENTION

45 **[0009]** The present invention overcomes the aforementioned shortcomings by providing for an HFC refrigerant that is not only soluble in conventional lubricants, but also has low flammability. Specifically, the applicants have identified that an HFC refrigerant comprising pentafluoropropane ("R-125"), 1,1,1,2-tetrafluoroethane ("R-134a"), and cyclopentane has unexpectedly high solubility with conventional lubricant oils while also being sufficiently non-flammable for refrigerant applications.

50 **[0010]** One aspect of the present invention is an HFC refrigerant suitable for use with conventional lubricant oils. In a preferred embodiment, the present refrigerant comprises R-125, R-134a and cyclopentane.

[0011] Another aspect of the present invention is a soluble combination of the refrigerant of the present invention and a lubricant. In a preferred embodiment, the combination comprises a refrigerant comprising R-125, R-134a and cyclopentane, and a lubricant selected from the group consisting of mineral oil, alkyl benzene oil, white (paraffinic) oil, and mixtures of two or more thereof.

55 **[0012]** Yet another aspect of the invention is a method of replacing CFCs and/or HCFCs in a refrigerant system while retaining the lubricant oil in the system. In a preferred embodiment, the method comprises the steps of: (a) removing the chlorine-containing refrigerant from the refrigeration system while retaining a substantial portion of the lubricant in

said system; and (b) introducing to said system a composition comprising R-125, R-134a, and cyclopentane.

[0013] Still other uses for the present HFC refrigerant are within the scope of the invention. Examples of such uses include use as aerosol propellants, heat transfer media, gaseous dielectrics, fire-extinguishing agents, foam blowing agents, solvents, and the like,

[0014] Applicants have come to appreciate that many refrigerants comprising R-125 and/or R-134a have limited solubility--and thus limited use--in conventional lubricants. Although n-pentane has been added previously to prior art HFC refrigerants to improve the solubility of such refrigerants in conventional lubricants, applicants have discovered that the incorporation of cyclopentane into refrigerants comprising R-125 and R-134a produces refrigerants exhibiting unexpectedly high solubility and an unexpectedly low flammability.

[0015] Surprisingly, applicants have discovered that the use of even minor amounts of cyclopentane in refrigerants comprising R-125 and R-134a improves drastically the solubility of such refrigerants in conventional lubricants. For example, compositions of the present invention comprising as little as 1.5 weight percent ("wt%"), based on the entire weight of the composition, have been found to have improved solubilities in conventional lubricants of up to 10 wt% over R-125/R-134a refrigerants without cyclopentane. This represents an increase in solubility equivalent to six times the amount of cyclopentane incorporated into the refrigerant. Such results are unexpected.

[0016] Accordingly, the present invention provides refrigerant compositions comprising R-125, R-134a and cyclopentane. Those of skill in the art will recognize that the solubility of the compositions of the present invention in conventional lubricants will depend on a number of variables including the relative amounts of R-125, R-134a and cyclopentane used in the refrigerant composition, as well as, the composition of the lubricant. In addition, the solubility of the present compositions in conventional lubricants will vary depending on temperature and pressure.

[0017] According to certain preferred embodiments, the compositions of the present invention have a solubility in conventional lubricants of at least about 10 wt%, based on the total weight of present composition and lubricant. More preferably, the present compositions have a solubility of at least about 15 wt%, and even more preferably at least about 20 wt%. In certain especially preferred embodiments, the present compositions have a solubility of about 25 wt%. It has also been found that the solubility of the refrigerant of the present invention is realized over a wide range of temperatures and pressures, for example, from about -40°C to about 60 °C and from about 0 psig to about 500 psig.

[0018] Furthermore, applicants have discovered unexpectedly that the lubricant-soluble compositions of the present invention are non-flammable. Figure 1 is a ternary flammability plot for compositions comprising R-125, R-134a and cyclopentane. The plot depicts graphically the range of flammable and non-flammable compositions comprising R-125, R-134a and cyclopentane, as measured using the apparatus described in Underwriter Laboratories Refrigerant Flammability test method 2182. As indicated in Fig. 1, compositions falling to the left of the graphed line are considered non-flammable, that is, they have a zero flame limit.

[0019] As illustrated in Fig 1, various compositions containing as much as about 8 wt% are non-flammable. Preferably, the refrigerant compositions of the present invention fall within the non-flammable region. According to certain embodiments, the refrigerant of the present invention comprises from about 35 to about 80 parts by weight of R-125, from about 15 to about 60 parts by weight of R-134a, and from about 0.1 to about 5 parts by weight of cyclopentane. In certain preferred embodiments, the refrigerant comprises from about 47 to about 80 parts by weight of R-125, from about 17 to about 60 parts by weight of R-134a, and from about 0.1 to about 3 parts by weight of cyclopentane. In even more preferred embodiments, the refrigerant comprises from about 48 to about 80 parts by weight of R-125, from about 18 to about 60 parts by weight of R-134a, and from about 0.1 to about 2 parts by weight of cyclopentane. According to other embodiments, the present refrigerant compositions consist essentially of R-125, R-134a and cyclopentane in various proportions and in the preferred ranges mentioned above.

[0020] In addition to R-125, R-134a and cyclopentane, the compositions of the invention may also contain additives such as oxidation resistance and thermal stability enhancers, corrosion inhibitors, metal deactivators, lubricity additives, viscosity index enhancers, pour and/or floc point depressants, detergents, dispersants, antifoaming agents, anti-wear agents, extreme pressure resistant additives, and combinations of two or more thereof.

[0021] Examples of oxidation resistance and thermal stability enhancers suitable for use in the present invention include, for example: diphenyl-, dinaphthyl-, and phenylnaphthyl-amines, in which the phenyl and naphthyl groups can be substituted, e.g., N,N'-diphenyl phenylenediamine, p-octyldiphenylamine, p,p'-dioctyldiphenylamine, N-phenyl-1-naphthyl amine, N-phenyl-2-naphthyl amine, N-(p-dodecyl)phenyl-2-naphthyl amine, di-1-naphthylamine, and di-2-naphthylamine, phenothiazines such as N-alkylphenothiazines; imino(bisbenzyl); hindered phenols such as 6-(t-butyl) phenol, 2,6-di-(t-butyl) phenol, 4-methyl-2,6-di-(t-butyl) phenol, 4,4'-methylenebis(2,6-di-(t-butyl) phenol); combinations of two or more thereof, and the like.

[0022] Examples of cuprous metal deactivators suitable for use in the present compositions include, for example: imidazole, benzimidazole, 2-mercaptobenzthiazole, 2,5-dimercaptothiadiazole, salicylidine-propylenediamine, pyrazole, benzotriazole, tolutriazole, 2-methylbenzamidazole, 3,5-imethyl pyrazole, and methylene bis-benzotriazole. Benzotriazole derivatives are preferred. Other examples of more general metal deactivators and/or corrosion inhibitors include organic acids and their esters, metal salts, and anhydrides, e.g., N-oleyl-sarcosine, sorbitan mono-oleate, lead

naphthenate, dodecenyl-succinic acid and its partial esters and amides, and 4-nonylphenoxy acetic acid; primary, secondary, and tertiary aliphatic and cycloaliphatic amines and amine salts of organic and inorganic acids, e.g., oil-soluble alkylammonium carboxylates; heterocyclic nitrogen containing compounds, e.g., thiazoles, substituted imidazolines, and oxazolines; quinolines, quinones, and anthraquinones; propyl gallate; barium dinonyl naphthalene sulfonate; ester and amide derivatives of alkenyl succinic anhydrides or acids, dithiocarbamates, dithiophosphates; amine salts of alkyl acid phosphates and their derivatives.

[0023] Examples of suitable lubricity additives include long chain derivatives of fatty acids and natural oils, such as esters, amines, amides, imidazolines, and borates.

[0024] Examples of suitable viscosity index enhancers include polymethacrylates, copolymers of vinyl pyrrolidone, as well as, methacrylates, polybutenes, and styrene-acrylate copolymers.

[0025] Examples of suitable pour point and/or floc point depressants include polymethacrylates such as methacrylate-ethylene-vinyl acetate terpolymers; alkylated naphthalene derivatives; and products of Friedel-Crafts catalyzed condensation of urea with naphthalene or phenols.

[0026] Examples of suitable detergents and/or dispersants include polybutenylsuccinic acid amides; polybutenyl phosphonic acid derivatives; long chain alkyl substituted aromatic sulfonic acids and their salts; and metal salts of alkyl sulfides, of alkyl phenols, and of condensation products of alkyl phenols and aldehydes.

[0027] Examples of suitable anti-foam agents include silicone polymers and acrylates.

[0028] Examples of suitable anti-wear and extreme pressure resistance agents include sulfurized fatty acids and fatty acid esters, such as sulfurized octyl tallate; sulfurized terpenes; sulfurized olefins; organopolysulfides; organophosphorus derivatives including amine phosphates, alkyl acid phosphates, dialkyl phosphates, aminedithiophosphates, trialkyl and triaryl phosphorothionates, trialkyl and triaryl phosphines, and dialkylphosphites, e.g., amine salts of phosphoric acid monohexyl ester, amine salts of dinonylnaphthalene sulfonate, triphenyl phosphate, tranaphthyl phosphate, diphenyl cresyl and dicresyl phenyl phosphates, naphthyl diphenyl phosphate, triphenylphosphorothionate; dithiocarbamates, such as an antimony dialkyl dithiocarbamate; chlorinated and/or fluorinated hydrocarbons, and xanthates.

[0029] An effective amount of the foregoing additive types is generally in the range from about 0.01 to about 5% for the antioxidant component, about 0.01 to about 5% for the corrosion inhibitor component, from about 0.001 to about 0.5% for the metal deactivator component, from about 0.5 to about 5% for the lubricity additives, from about 0.01 to about 2% for each of the viscosity index enhancers and pour and/or floc point depressants, from about 0.1 to about 5% for each of the detergents and dispersants, from about 0.001 to about 0.1% for anti-foam agents, and from about 0.1 to about 2% for each of the anti-wear and extreme pressure resistance components. All these percentages are by weight and are based on the total composition. It is to be understood that more or less than the stated amounts of additives may be more suitable to particular circumstances, and that a single molecular type or a mixture of types may be used for each type of additive component. As used herein, the term "effective amount" means the amount of each component which upon combination with the other component or components, results in the formation of the present compositions.

[0030] Many of the aforementioned additives are multifunctional. For example, certain additives may impart both anti-wear and extreme pressure resistance properties, or function both as a metal deactivator and a corrosion inhibitor. Cumulatively, all additives preferably do not exceed about 8% by weight, or more preferably do not exceed about 5% by weight, of the total composition.

[0031] The present invention further provides a soluble combination of a refrigerant of the present invention and a lubricant. Suitable lubricating oils for use in the soluble combination include mineral oil, hydrocarbon oil, alkylbenzene oil, white or paraffinic oil, and mixtures of two or more thereof. The lubricating oil is preferably present in an amount of from about 1 to about 60 weight percent, based on the total weight of the combination. More preferably, the lubricating oil is present in an amount of from about 10 to about 50 weight percent.

[0032] The compositions of the present invention are suitable for a wide range of uses and are particularly well suited for use in refrigeration systems. As used herein the term "refrigeration system" refers generally to any system or apparatus, or any part or portion of such a system or apparatus, which condenses and expands a refrigerant to effect heat transfer. Such systems typically have a low pressure portion in which the refrigerant is expanded and vaporized, thereby absorbing heat, and a high pressure portion in which the refrigerant is compressed and condensed, thereby expending heat. Examples of such systems include air conditioners, heat pumps, and refrigerators.

[0033] According to certain embodiments, the present invention provides a method for recharging a refrigerant system that contains a chlorine-containing refrigerant composing the steps of: (a) removing the chlorine-containing refrigerant from the refrigeration system; and (b) introducing to said system an HFC refrigerant of the present invention.

[0034] With respect to step (a), it is preferable to perform the removal step in the low pressure portion of the system to avoid the need for pressure-rated evacuation systems and connectors and to take advantage of the volatility of the refrigerants (the boiling point of refrigerants are generally under 10°C) and their tendency to escape from the system if allowed. Low pressure removal of CFC refrigerants may be achieved in any of a number of ways, including, for

example, by using a refrigerant recovery system (such as that commercially available through Robinair of Ohio) to pump chlorine-containing refrigerants in the gaseous state out of the system, or by using a cooled, evacuated refrigerant container connected to the low pressure portion of a refrigeration system to draw gaseous refrigerant from the system. To aid in the removal of CFC refrigerant, it may be preferable to use a compressor to pump the refrigerant from the system to a container. The refrigerant also may be flushed from the system using the replacement HFC refrigerant.

[0035] Those of skill in the art will recognize that the refrigeration systems used in the methods of the present invention generally comprise a compressor and an expansion chamber in which both a refrigerant and lubricant are contained and through which the refrigerant and lubricant can be circulated. In a preferred embodiment, the removal step (a) comprises removing a chlorine-containing refrigerant from a refrigeration system while leaving a substantial portion of the lubricant behind. As used herein, the term "substantial portion" refers generally to a quantity of lubricant which is at least about 50% (by weight) of the quantity of lubricant contained in the refrigeration system prior to removal of the chlorine-containing refrigerant. Preferably, the substantial portion of lubricant in the system is a quantity of at least about 70% of the lubricant contained originally in the refrigeration system, and, more preferably, a quantity of at least about 90%. In circumstances in which it is desirable to leave the existing lubricant behind, it is preferable to exploit the relatively high volatility of the refrigerant compared to the lubricant (the boiling point of mineral oils are generally over 200 °C), and to evacuate the CFC refrigerant as a gas while the lubricant remains behind in the liquid phase. Thus, the techniques discussed above for removing the refrigerant from system as a vapor are preferred over removing the refrigerant as a liquid.

[0036] With respect to step (b), any method for introducing the refrigerant composition to a refrigeration system can be used in the present invention. Again, it is preferable to introduce the HFC refrigerant to the system in the low pressure portion of the system to avoid the need for high pressure-rated equipment. For example, one method comprises attaching a refrigerant container to the low-pressure portion of a refrigeration system and turning on the refrigeration system compressor to pull the refrigerant into the system. In such embodiments, the refrigerant container may be placed on a scale such that the amount of refrigerant composition entering the system can be monitored. When a desired amount of refrigerant composition has been introduced into the system, charging is stopped.

[0037] The compositions of the present invention can be used in refrigeration and heat pump applications to produce cooling and/or heating, via methods well-known in the art. For example, as will be recognized by those of skill in the art, cooling and heat is traditionally produced by the condensing and evaporating of refrigerant compositions in refrigerant/heating systems. Accordingly, the compositions of the present invention may be used to effect heat transfer via a method comprising the steps of: (a) condensing the refrigerant of the present invention; (b) removing heat from the refrigerant; (c) evaporating the refrigerant; and (d) adding heat to the refrigerant.

EXAMPLES

[0038] In order to illustrate, in a non-limiting manner, the present invention is described in connection with the following examples of the present compositions.

Example 1

[0039] The following example illustrates the non-flammability characteristics associated with compounds of the present invention.

The critical flammability ratio (C.F.R.) of compositions comprising R-125, R-134a, and cyclopentane are determined using the apparatus described in Underwriter Laboratories Refrigerant Flammability test method 2182 at 60°C. C.F.R. allows determination of the maximum amounts of flammable materials can be added to a mixture before the mixture itself becomes flammable. Cyclopropane, a flammable material, was added to R-125, R-134 and a mixture of R-125 and R-134a. The resulting flammability data is reported in Table 1 below. In addition, Figure 1 illustrates graphically the range of flammable and non-flammable compositions comprising R-125/R-134a and cyclopentane. As indicated, those compositions falling to the left of the plotted line represent the non-flammable compositions.

Table 1

Temp (°C)	Refrigerant	Wt.% Cyclopentane
60	R-134a (94.8wt.%)	5.2
60	R-125 (91.8wt.%)	8.2
60	R-134a (45.5wt.%) / R-125 (47.7wt.%)	6.8

Example 2

[0040] The following example illustrates the relatively high solubility of the HFC refrigerant as manifested by improved lubricant circulation observed in air conditioning systems comprising a composition of the present invention over systems comprising prior art 407C refrigerants.

[0041] A composition of the present invention comprising 61.5 wt.% R-125, 35 wt.% R-134a and 3.5 wt.% cyclopentane ("Comp. A") and an R-407C (a non-azeotropic blend of difluoromethane (R-32), R-125 and R-134a) refrigerant were prepared. The present composition and R-407C refrigerant were placed in refrigeration machines containing mineral oil (Copeland blended white oil, commercially available from Copeland as Catalog No. 999-5170-31) and tested to measure oil return within the systems.

[0042] Testing was performed in a 2 ton air conditioner system setup similar to the unit reported in Report DOE/CE/23810-71 "Study of Lubricant Circulation in HVAC Systems," March 1995-April 1996 (author Frank R. Biancardi et. al.; prepared for Air Conditioning and Refrigeration Technology Institute Under ARTI/MCLR Project No. 665-53100) except that, instead of equal size risers, three different size risers (3/4", 7/8" and 1 1/8") were used to allow a greater variety of velocities. Also, the ability to pump oil from the compressor sump into the compressor discharge line was added. Using a hand pump, 90cc of oil from the sump was injected into the compressor discharge line. By observing the oil level in the compressor sump versus time, it was noticed that the oil return was considerably faster with the present composition without any significant effect on capacity or coefficient of performance ("COP"). The capacity and COP data are shown in Table 1 below.

Table 1

Composition	Capacity (tons)	COP
R-407C	1.70	2.9
Comp. A	1.63	2.8

[0043] Therefore, the ability of the refrigerant of the present invention to increase oil return over R-407C is indicative of its greater solubility.

Example 3

[0044] The following example also illustrates the relatively higher solubility of compositions of the present invention as compared to an R-407C refrigerant.

[0045] Three refrigerant compositions were prepared and tested for solubility in mineral oil. The first composition ("A") was an R-407C refrigerant, the second composition ("B") was comprised of 25 wt% R-134a, 70 wt% R-125, and 5 wt% cyclopentane, and the third composition ("C") was comprised of 35 wt% R-134a, 63 wt% R-125, and 2 wt% cyclopentane. The solubility of the compositions was tested by mixing the refrigerants with a mineral oil (C3 oil, an oil available commercially from Calgon Corp. having a viscosity of 32 centistokes at 37 °C) in sealed glass tubes and observing the concentrations at which two liquid phases appeared. The maximum solubility observed for each of the three refrigerants in mineral oil was: A=15 wt%, B=25 wt%, and C=25 wt%.

Example 4

[0046] The following example illustrates the relatively high solubility of the HFC refrigerant as manifested by improved lubricant circulation observed in heat pump systems comprising a composition of the present invention over systems comprising prior art R-417A refrigerants.

[0047] Three refrigerants were prepared for use and testing in a heat pump system. The first refrigerant was a composition of the present invention comprising 63 wt.% R-125, 35.5 wt.% R-134a and 1.5 wt.% cyclopentane, the second was an R-417A (composed of 46.5% R-125, 50.0% R-134a, and 3.5% n-butane) refrigerant, and the third was an R-22 refrigerant.

[0048] The refrigerants were introduced into a heat pump comprising a compressor manufactured by Copeland Corporation (model number ZR22K3-PFV) and a suction accumulator manufactured by Parker Hannifan (model number PA5093-9-6C). Evaporator and condenser coils were sized and manufactured to manage the 7kW capacity of the compressor. Both the suction accumulator and compressor were modified to include sight glasses or tubes to view inside the accumulator and to determine the oil level in the compressor.

[0049] Tests were run in both heating and cooling modes. All three refrigerants returned typical hydrocarbon mineral oil to compressor in the cooling mode at standard air conditioning conditions and in the heating mode at high temper-

ature heating conditions. However at low outdoor temperature heating conditions (at or below -7°C) the R-417A mixture starting accumulating oil and liquid refrigerant in the suction accumulator. Due to the formation of two layers in this component with the oil-rich layer floating on top of the refrigerant-rich layer, the oil was never in contact with the oil return hole in the bottom of the suction tube so oil did not get back to the compressor. This was observed by watching the oil layer grow in the accumulator and the oil level decrease in the compressor sump. The system had to be shutdown due to the concern of running the compressor without sufficient oil. This behavior was not seen when the system operated with the cyclopentane mixture or when running the baseline R-22 tests.

Claims

1. A composition comprising a refrigerant, said refrigerant comprising at least from about 35 to about 80 parts by weight of R-125, from about 15 to about 60 parts by weight of R-134a, and from about 0.1 to about 5 parts by weight of cyclopentane.
2. The composition of claim 1, wherein said refrigerant comprises from about 47 to about 80 parts by weight of R-125, from about 17 to about 60 parts by weight of R-134a and from about 0.1 to about 3 parts by weight of cyclopentane.
3. The composition of claim 2, wherein said refrigerant comprises from about 48 to about 80 parts by weight of R-125, from about 18 to about 60 parts by weight of R-134a and from about 0.1 to about 2 parts by weight of cyclopentane.
4. The composition of any preceding claim, further comprising an additive selected from the group consisting of oxidation resistance enhancers, thermal stability enhancers, corrosion inhibitors, metal deactivators, lubricity additives, viscosity index enhancers, pour depressants, floc point depressants, detergents, dispersants, antifoaming agents, anti-wear agents, extreme pressure resistant additives, and combinations of two or more thereof.
5. The composition of any preceding claim, further comprising a lubricating oil.
6. The composition of claim 5, wherein said lubricating oil comprises from about 1 to about 60 percent by weight of the composition.
7. The composition of claim 6, wherein said lubricating oil comprises from about 10 to about 50 percent by weight of the composition.
8. The composition of claim 1, wherein said refrigerant consists essentially of from about 35 to about 80 parts by weight of R-125, from about 15 to about 60 parts by weight of R-134a, and from about 0.1 to about 5 parts by weight of cyclopentane.
9. A method of recharging a refrigeration system comprising the step of:
 - (a) removing a chlorine-containing refrigerant from said refrigeration system; and
 - (b) introducing to said system a composition as defined in any preceding claim.
10. A method of recharging a refrigeration system comprising the steps of:
 - (a) removing a chlorine-containing refrigerant from the refrigeration system while retaining a substantial portion of a lubricant oil in said system; and
 - (b) introducing to said system a composition as defined in any of claims 1 to 8.
11. A method of effecting heat transfer comprising the steps of:
 - (a) condensing a composition comprising a refrigerant as defined in any of claims 1 to 3;
 - (b) removing heat from the condensed refrigerant;
 - (c) evaporating the refrigerant; and
 - (d) adding heat to the refrigerant during evaporation.

Ternary Flammability Plot

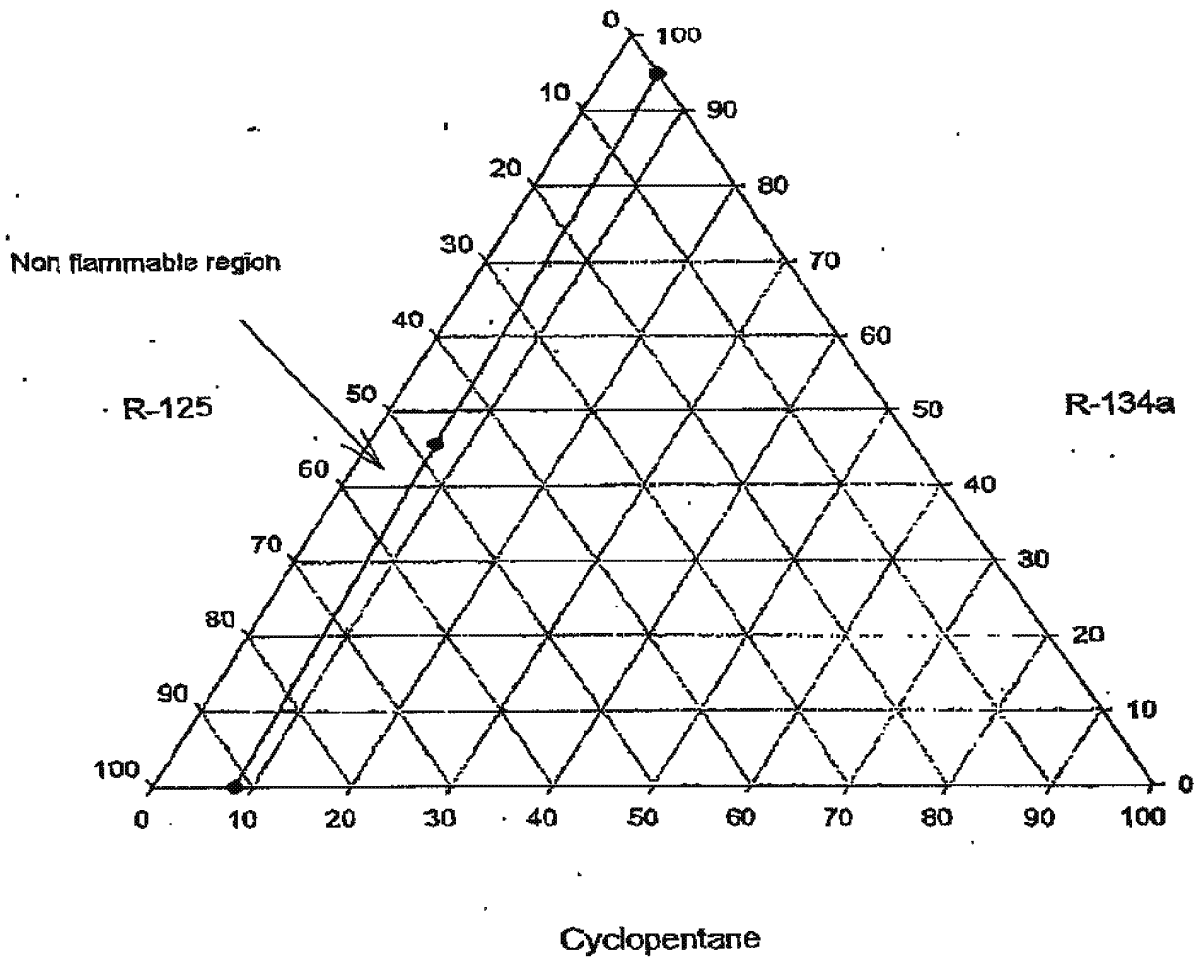


Figure 1

Electronic Patent Application Fee Transmittal

Application Number:	10937736			
Filing Date:	08-Sep-2004			
Title of Invention:	Refrigerant with lubricating oil for replacement of R22 refrigerant			
First Named Inventor/Applicant Name:	Kenneth M. Ponder			
Filer:	Todd Deveau./Laurie Delesandro			
Attorney Docket Number:	821920-1030			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 2 months with \$0 paid	2252	1	225	225

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	395	395
Total in USD (\$)				620

Electronic Acknowledgement Receipt

EFS ID:	2078539
Application Number:	10937736
International Application Number:	
Confirmation Number:	1006
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./Laurie Delesandro
Filer Authorized By:	Todd Deveau.
Attorney Docket Number:	821920-1030
Receipt Date:	13-AUG-2007
Filing Date:	08-SEP-2004
Time Stamp:	19:12:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 620
RAM confirmation Number	3335
Deposit Account	200778
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	00566827.pdf	893600	no	3
			bcd8dc1f41bf982b2d7988e45d17268a84eac035		
Warnings:					
Information:					
2	Extension of Time	00566978.pdf	57140	no	1
			c71ea7b6807786810eb6c067ae9c188d5bcf4dd		
Warnings:					
Information:					
3		00566979.pdf	101769	yes	10
			c7eb28414517ecd0f3d31f7aab977a6b53ea1ebc		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Specification		2	2	
	Claims		3	7	
	Applicant Arguments/Remarks Made in an Amendment		8	10	
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Filed	00566832.pdf	697102	no	4
			a95a6eeb4d093181e286e9de4f94b69083835a07		
Warnings:					
Information:					
5	Foreign Reference	00483761.pdf	566276	no	35
			08f97ebac8d186f4c3a4dff85bca9e8574276b8		
Warnings:					
Information:					
6	Foreign Reference	00483766.pdf	290499	no	8
			db05da3b17c0f6ddb4d7614cddbcb7972981add7		
Warnings:					
Information:					

7	NPL Documents	00484061.pdf	892497	no	8
			2b1024dde79e7ceeca4ffc04442ab26041f26924		
Warnings:					
Information:					
8	NPL Documents	00484062.pdf	393487	no	4
			c0f57341656827b71f32df82dc2085c4d714d5f4		
Warnings:					
Information:					
9	NPL Documents	00566975.pdf	211651	no	4
			d39f7bc8a1488b5273b5b65cfc78fd60d000a03a		
Warnings:					
Information:					
10	NPL Documents	00566976.pdf	270408	no	4
			9fc1a2fe92334639649d6612b7be04f0e9922af1		
Warnings:					
Information:					
11	NPL Documents	00566977.pdf	1565735	no	35
			9c13f3da7a1c9dc44236631ead8e20205173e6e1		
Warnings:					
Information:					
12	Fee Worksheet (PTO-06)	fee-info.pdf	8321	no	2
			401e23f8fe3b784d3b9ee1fb0daa1ab489c1d57f		
Warnings:					
Information:					
Total Files Size (in bytes):			5948485		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application No. <u>10/137,136</u>	
APPLICATION AS FILED - PART I						
(Column 1)		(Column 2)		SMALL ENTITY		OR
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)
BASIC FEE (37 CFR 1.18(a), (b), or (c))						
SEARCH FEE (37 CFR 1.18(k), (l), or (m))						
EXAMINATION FEE (37 CFR 1.18(o), (p), or (q))						
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X	=	X	=
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X	=	X	=
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).					
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))						
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL		TOTAL	
APPLICATION AS AMENDED - PART II						
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR
Total (37 CFR 1.16(i))	26	43	/	X	=	OR
Independent (37 CFR 1.16(h))	3	5	/	X	=	OR
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		TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR
Total (37 CFR 1.16(i))	26	43	/	X	=	OR
Independent (37 CFR 1.16(h))	3	5	/	X	=	OR
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		TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.						

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

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.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875.

Application or Docket Number

10937736

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a))		
TOTAL CLAIMS (37 CFR 1.16(c))		minus 20 = *
INDEPENDENT CLAIMS (37 CFR 1.16(b))		minus 3 = *
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(d))		

* If the difference in column 1 is less than zero, enter "0" in column 2.

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

RATE	FEE
	\$
X \$	=
X \$	=
+ \$	=
TOTAL	

OR

OR

OR

OR

OR

OR

RATE	FEE
	\$
X \$	=
X \$	=
+ \$	=
TOTAL	

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
8/13/07			
Total (37 CFR 1.16(c))	26	Minus ** 43	=
Independent (37 CFR 1.16(b))	3	Minus *** 5	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

OR

OR

OR

OR

OR

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(c))	*	Minus **	=
Independent (37 CFR 1.16(b))	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

OR

OR

OR

OR

OR

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(c))	*	Minus **	=
Independent (37 CFR 1.16(b))	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

OR

OR

OR

OR

OR

RATE	ADDITIONAL FEE
X \$	=
X \$	=
+ \$	=
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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



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.
10/937,736	09/08/2004	Kenneth M. Ponder	821920-1030	1006

24504 7590 08/20/2007
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
100 GALLERIA PARKWAY, NW
STE 1750
ATLANTA, GA 30339-5948

EXAMINER

HARDEE, JOHN R

ART UNIT	PAPER NUMBER
----------	--------------

1751

MAIL DATE	DELIVERY MODE
-----------	---------------

08/20/2007

PAPER

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.

Office Action Summary

Application No.

10/937,736

Applicant(s)

PONDER ET AL.

Examiner

John R. Hardee

Art Unit

1751

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10,21-25,27,29-31,33-35 and 37-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10,21-25,27,29-31,33-35 and 37-40 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date 08132007.

- 4) ☒ Interview Summary (PTO-413)
- Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. 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 final rejection. 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, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 13, 2007 has been entered.

Specification

2. The amendment filed August 13, 2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The specification as originally filed does not provide basis for switching the percentages of pentafluoroethane and tetrafluoroethane. See the 112 rejection below.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 1751

4. Claims 1-10, 21-25, 27, 29-31, 33-35 and 37-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

This is a new matter rejection. The specification does not provide basis for switching the percentages of pentafluoroethane and tetrafluoroethane. The inherent properties of the compositions in Table 2 do not provide adequate basis in the absence of a teaching, available at the time of filing, that the disclosed mixtures possess the disclosed physical properties.

5. 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. Douglas McGinty, may be reached at (571) 272-1029.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8100.

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.

Art Unit: 1751

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).

A handwritten signature in black ink, appearing to read "J. Hardee", with a stylized, cursive script.

John R. Hardee

Primary Examiner

August 15, 2007

Interview Summary	Application No.	Applicant(s)	
	10/937,736	PONDER ET AL.	
	Examiner	Art Unit	
	John R. Hardee	1751	

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

(1) John R. Hardee. (3)_____

(2) PTO Quality Assurance Specialist Kathryn Gorgos. (4)_____

Date of Interview: 15 August 2007.

Type: a) ☐ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☐ No.
If Yes, brief description: _____

Claim(s) discussed: all pending.

Identification of prior art discussed: _____

Agreement with respect to the claims f) ☐ was reached. g) ☐ was not reached. h) ☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The specification does not provide basis for switching the percentages of pentafluoroethane and tetrafluoroethane. The inherent properties of the mixtures in Table 2 might provide basis if a secondary teaching of the properties of these mixtures had been available to the person of ordinary skill in the art at the time of filing. An affidavit would not suffice to overcome a new matter rejection.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiner's Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

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

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

Application Number	10937736
Filing Date	2004-09-08
First Named Inventor	Ponder, K.
Art Unit	1751
Examiner Name	Hardee, J.
Attorney Docket Number	821920-1030

U.S. PATENTS

[Remove](#)

Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	5976399		1999-11-02	Schnur	

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

[Add](#)

U.S. PATENT APPLICATION PUBLICATIONS

[Remove](#)

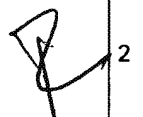
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1					

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

[Add](#)

FOREIGN PATENT DOCUMENTS

[Remove](#)

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	WO01/23493	WO		2001-04-05	Refrigerant Products, Ltd.		☐
	2	EP1295928	EP		2003-03-26	Honeywell International, Inc.		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button.

[Add](#)

NON-PATENT LITERATURE DOCUMENTS

[Remove](#)

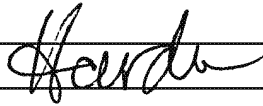
**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		10937736
Filing Date		2004-09-08
First Named Inventor	Ponder, K.	
Art Unit	1751	
Examiner Name	Hardee, J.	
Attorney Docket Number	821920-1030	

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
R	1	ASHRAE Standard Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Addendum c to ANSI/ASHRAE Standard 34-2001, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (2003)	☐ ✓
R	2	ASHRAE Standard Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Addendum h to ANSI/ASHRAE Standard 34-2004, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (2006)	☐ ✓
R	3	ASHRAE Standard Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Addendum d to ANSI/ASHRAE Standard 34-2001, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (2003)	☐ ✓
R	4	ASHRAE Standard Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Addendum e to ANSI/ASHRAE Standard 34-2001, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (2003)	☐ ✓
R	5	Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Addenda a, b, c, e, f, k, n, o, p, q, r, s and u to ANSI/ASHRAE Standard 34-2004, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (2006)	☐ ✓

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	8/15/07
--------------------	---	-----------------	---------

*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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	Docket No.: 821920-1030
PONDER, K., et al.,	Art Unit: 1751
Serial No.: 10/937,736	Examiner: John R. Hardee
Filing Date: September 8, 2004	Confirmation No.: 1006
For: Refrigerant with Lubricating Oil for Replacement of R-22 Refrigerant	

STATEMENT OF SUBSTANCE OF INTERVIEW

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

Sir:

This statement is timely submitted in response to the Interview Summary (Paper No. 20070807) mailed August 10, 2007. Applicants wish to thank the Examiner for the telephonic interview of 2 August 2007. During the interview possible amendments to the claims were discussed and whether the submission of a Request for Continued Examination (RCE) would be the better way to advance consideration of the proposed claim amendments and also consideration of the IDS. The possibility of an affidavit to overcome the art was also discussed. Applicants elected to proceed by submitting an RCE that has now been submitted.

Respectfully Submitted,

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

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

100 Galleria Parkway, Suite 1750
Atlanta, Georgia 30339-5948
(770) 933-9500

Electronic Acknowledgement Receipt	
EFS ID:	2176384
Application Number:	10937736
International Application Number:	
Confirmation Number:	1006
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./Laurie Delesandro
Filer Authorized By:	Todd Deveau.
Attorney Docket Number:	821920-1030
Receipt Date:	10-SEP-2007
Filing Date:	08-SEP-2004
Time Stamp:	15:06:16
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	Applicant summary of interview with examiner	00580127.pdf	73425 4b6f8a76cf332ac3251254343b962f790e007ecf	no	1

Warnings:

Information:	
Total Files Size (in bytes):	73425
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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:

PONDER, K., et al.,

Serial No.: 10/937,736

Filing Date: September 8, 2004

Docket No.: 821920-1030

Art Unit: 1751

Examiner: John R. Hardee

Confirmation No.: 1006

For: Refrigerant with Lubricating Oil for Replacement of R-22 Refrigerant

RESPONSE AND AMENDMENT

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

Sir:

The non-final Office Action Paper No./Mail Date 20070815, from Examiner John R. Hardee of Art Unit 1751, mailed August 20, 2007, has been received and carefully reviewed. Applicants respectfully request reconsideration and withdrawal of the rejections presented in the Office Action in view of the following remarks and amendments. No new matter and, thus, no new issues are presented.

DEPOSIT ACCOUNT AUTHORIZATION

It is not believed that any additional extensions of time or fees 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.

REMARKS

The non-Final Office Action presents two issues. One, the Specification is objected to under 35 U.S.C. 132a on the basis that it introduces new matter into the disclosure. Two, claims 1-10, 21-25, 27, 29-31, 33-35 and 37-40 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement on the grounds that the claim(s) contains subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention and is identified as a new matter rejection. More particularly, the Office Action comments that the Specification does not provide basis for switching the percentages of pentafluoroethane and tetrafluoroethane, and further, that the inherent properties of the compositions in Table 2 do not provide adequate basis in the absence of a teaching, available at the time of filing, that the disclosed mixtures possess the disclosed physical properties. Applicant respectfully traverses these rejections.

It is not new matter where one skilled in the art would not only recognize the existence of error in the Specification, but also the appropriate correction. In such a case, an amendment to correct such an error does not constitute new matter. See, MPEP Section 2163.07 (II Obvious Errors). Further, by disclosing in a patent application a device, or composition, that inherently performs a function, or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. In such case, the application may later be amended to recite the function, theory or advantage without introducing prohibited new matter. See, MPEP Section 2163.07(a).

Applicant respectfully submits that the present case fits the situations noted above which allow amendment without constituting new matter. More particularly, Applicant submits herewith the Declaration of Andy Gbur. In his Declaration, Mr. Gbur comments that he reviewed the published version of the above-identified patent application, U.S. Patent Publication 2005 0082510 and in particular, Figs. 1 and 2, the text appearing in Sections [0054-0057], corresponding to page 13, lines 1-15, and Table 2 appearing in the publication and that he noticed an obvious error in the application. Mr. Gbur states that the error he noticed relates to the description and labeling of the Pressure vs. Temperature profiles in Fig. 1, the Temperature vs. Enthalpy profiles in Fig. 2, and the related text appearing in the above noted paragraphs. He further comments

that it is obvious to him that Fig. 1 shows Pressure (liquid) vs. Temperature profiles for blends of 40/60, 45/55 and 42/58 of tetrafluoroethane and pentafluoroethane, respectively. He further states that it is also obvious to him that Fig. 2 shows Temperature vs. Enthalpy profiles comparing a blend of 40/60 tetrafluoroethane and pentafluoroethane to R-22. Mr. Gbur further states it is obvious to him that the data in the middle three columns in Table 2 for P(60/40) is for 60% pentafluoroethane and 40% tetrafluoroethane, for P(58-42) is for 58% pentafluoroethane and 42% tetrafluoroethane, and for P(55-45) is for 55% pentafluoroethane and 45% tetrafluoroethane.

Mr. Gbur states it is his opinion that others skilled in the art of refrigerant compositions would also recognize these obvious errors in Figures 1 and 2, and in paragraphs [0054-0057] and how the descriptions and text should read. He also states it is his opinion that one skilled in the art of refrigerant compositions would recognize that the heading P(60-40) in Table 2 represents 60% pentafluoroethane and 40% tetrafluoroethane, the heading P(58-42) represents 58% pentafluoroethane and 42% tetrafluoroethane, and the heading P(55-45) represents 55% pentafluoroethane and 45% tetrafluoroethane.

With reference to Fig. 1, for example, Mr. Gbur states it is his opinion that one skilled in the art of refrigerant compositions would recognize that as the concentration of pentafluoroethane drops in a composition of pentafluoroethane and tetrafluoroethane, the Pressure vs. Temperature profile curve would likewise drop because one skilled in the art would recognize that lowering the concentration of pentafluoroethane in such a composition would generally cause the vapor pressure of the composition at a given temperature to decrease as the amount of pentafluoroethane is decreased and not increase. Mr. Gbur states, thus, one skilled in the art of refrigerant compositions would recognize that the top curve in Figure 1 represents the Pressure vs. Temperature profile for a composition of pentafluoroethane and tetrafluoroethane having 60% pentafluoroethane, the next curve down would represent the profile for such a composition having 58% pentafluoroethane, and the third curve down would represent the profile for such a composition having 55% pentafluoroethane, as represented by the key in Figure 1. Mr. Gbur also states that likewise one skilled in the art would recognize that the Pressure vs. Temperature data the middle three columns in Table 2 reflects a 60% pentafluoroethane composition in the left column of the three columns, labeled P(60-40), decreasing to 58% pentafluoroethane and then to 55% pentafluoroethane in

the right column of the three columns consistent with the drop in pressures in the columns from left to right.

Accordingly, Applicant respectfully submits that the amendments presented previously do not present new matter. In particular, Applicant submits that the Specification does provide a basis for switching the percentages of pentafluoroethane and tetrafluoroethane, and further, that the inherent properties of the compositions in Table 2, as well as Figs. 1 and 2 and related text in the Specification do provide adequate basis and a teaching, available at the time of filing, that the disclosed mixtures possess the disclosed physical properties claimed.

CONCLUSION

In light of the foregoing remarks, Applicant respectfully submits that the application is in condition for allowance. If the Examiner has any questions about the above remarks, or 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, KAYDEN, HORSTEMEYER
& RISLEY, L.L.P.**

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

100 Galleria Parkway, Suite 1750
Atlanta, Georgia 30339-5948
(770) 933-9500

Electronic Acknowledgement Receipt

EFS ID:	2393513
Application Number:	10937736
International Application Number:	
Confirmation Number:	1006
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./Laurie Delesandro
Filer Authorized By:	Todd Deveau.
Attorney Docket Number:	821920-1030
Receipt Date:	30-OCT-2007
Filing Date:	08-SEP-2004
Time Stamp:	15:02:13
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		00603681.pdf	180902 213a951c26d313647597c01cc8479a33e9d5418d	yes	4

Multipart Description/PDF files in .zip description			
Document Description		Start	End
Amendment - After Non-Final Rejection		1	1
Applicant Arguments/Remarks Made in an Amendment		2	4

Warnings:

Information:

Total Files Size (in bytes):	180902
-------------------------------------	--------

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Docket No.: 821920-1030

PONDER, K., et al.,

Confirmation No.: 1006

Serial No.: 10/937,736

Group Art Unit: 1751

Filing Date: September 8, 2004

Examiner: John R. Hardee

For: **Refrigerant with Lubricating Oil for Replacement of R-22 Refrigerant**

DECLARATION OF ANDY GBUR

I, Andy Gbur, hereby declare as follows:

1. I am the Director of Operations for Intertek, ETL SEMKO Division.
2. My duties at Intertek include financial and technical oversight of the Refrigeration Chemistry laboratory.
3. My educational background includes B.S. in Chemistry from the Ohio State University
4. My work experience prior to joining Intertek includes I have been employed with Intertek (Integral Sciences) for the last 15 yrs since graduation.
5. I reviewed the published version of the above-identified patent application, U.S. 2005 0082510, and in particular, Figures 1 and 2, the text appearing in sections [0054-0057] and Table 2 appearing in the publication and noticed an obvious error in the application. The error relates to the description and labeling of the Pressure vs. Temperature profiles in Figure 1, the Temperature vs. Enthalpy profiles in Figure 2, and the related text appearing in paragraphs [0054-0057]. It is obvious to me that Figure 1 shows Pressure (liquid) vs. Temperature profiles for blends of 40/60, 45/55 and 42/58 of tetrafluoroethane and pentafluoroethane, respectively. It is also obvious to me that Figure 2 shows Temperature vs. Enthalpy profiles comparing a blend of 40/60 tetrafluoroethane and pentafluoroethane to R-22. Likewise, it is obvious to me that the

data in the middle three columns in Table 2 for P(60/40) is for 60% pentafluoroethane and 40% tetrafluoroethane, for P(58-42) is for 58% pentafluoroethane and 42% tetrafluoroethane, and for P(55-45) is for 55% pentafluoroethane and 45% tetrafluoroethane.

6. Based on my background and experience, it is my opinion that others skilled in the art of refrigerant compositions would also recognize these obvious errors in Figures 1 and 2, and in paragraphs [0054-0057] and how the descriptions and text should read. It is also my opinion that one skilled in the art of refrigerant compositions would recognize that the heading P(60-40) in Table 2 represents 60% pentafluoroethane and 40% tetrafluoroethane, the heading P(58-42) represents 58% pentafluoroethane and 42% tetrafluoroethane, and the heading P(55-45) represents 55% pentafluoroethane and 45% tetrafluoroethane.

7. With reference to Figure 1, for example, it is my opinion that one skilled in the art of refrigerant compositions would recognize that as the concentration of pentafluoroethane drops in a composition of pentafluoroethane and tetrafluoroethane, the Pressure vs. Temperature profile curve would likewise drop because one skilled in the art would recognize that lowering the concentration of pentafluoroethane in such a composition would generally cause the vapor pressure of the composition at a given temperature to decrease as the amount of pentafluoroethane is decreased and not increase. Thus one skilled in the art of refrigerant compositions would recognize that the top curve in Figure 1 represents the Pressure vs. Temperature profile for a composition of pentafluoroethane and tetrafluoroethane having 60% pentafluoroethane, the next curve down would represent the profile for such a composition having 58% pentafluoroethane, and the third curve down would represent the profile for such a composition having 55% pentafluoroethane, as represented by the key in Figure 1. Likewise one skilled in the art would recognize that the Pressure vs. Temperature data

the middle three columns in Table 2 reflects a 60% pentafluoroethane composition in the left column of the three columns, labeled P(60-40), decreasing to 58% pentafluoroethane and then to 55% pentafluoroethane in the right column of the three columns consistent with the drop in pressures in the columns from left to right.

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: 5-17-07


Andy Gbur

Electronic Acknowledgement Receipt

EFS ID:	2393619
Application Number:	10937736
International Application Number:	
Confirmation Number:	1006
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.
Filer Authorized By:	
Attorney Docket Number:	821920-1030
Receipt Date:	30-OCT-2007
Filing Date:	08-SEP-2004
Time Stamp:	15:07:48
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	Miscellaneous Incoming Letter	00603686.pdf	107195 a12299a163da4d0fc0404dcd3d96f4402a9e47d	no	3

Warnings:

Information:	
Total Files Size (in bytes):	107195
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	

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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 10/937,736		Filing Date 09/08/2004		☐ To be Mailed		
APPLICATION AS FILED – PART I											
(Column 1)			(Column 2)		SMALL ENTITY ☒		OR		OTHER THAN SMALL ENTITY		
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)			RATE (\$)	FEE (\$)	
☒ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A	385			N/A		
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A	N/A		N/A				N/A		
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A		N/A				N/A		
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*		X \$ =		OR		X \$ =		
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*		X \$ =				X \$ =		
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
					TOTAL	385			TOTAL		
* If the difference in column 1 is less than zero, enter "0" in column 2.											
APPLICATION AS AMENDED – PART II											
(Column 1)			(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT	10/30/2007	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 26	Minus	** 43	= 0	X \$25 =	0	OR	X \$ =		
	Independent (37 CFR 1.16(h))	* 3	Minus	***5	= 0	X \$105 =	0	OR	X \$ =		
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						TOTAL ADD'L FEE	0	OR		TOTAL ADD'L FEE	
AMENDMENT		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))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						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 number found in the appropriate box in column 1.											

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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



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.
-----------------	-------------	----------------------	---------------------	------------------

10/937,736

09/08/2004

Kenneth M. Ponder

821920-1030

1006

24504

7590

12/14/2007

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
600 GALLERIA PARKWAY, S.E.
STE 1500
ATLANTA, GA 30339-5994

EXAMINER

HARDEE, JOHN R

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

12/14/2007

PAPER

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.

Interview Summary	Application No.	Applicant(s)	
	10/937,736	PONDER ET AL.	
	Examiner	Art Unit	
	John R. Hardee	1796	

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

(1) John R. Hardee. (3) _____

(2) Atty. Deveau. (4) _____

Date of Interview: 11 December 2007.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.

If Yes, brief description: _____

Claim(s) discussed: _____

Identification of prior art discussed: Takagawa et al., US 6,207,071.

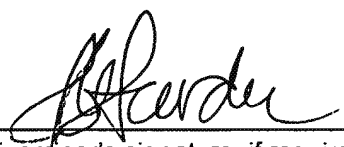
Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Examiner agreed to get a third opinion regarding whether the reference fairly discloses a mixture of refrigerant gases consisting of R-125 and R-134a as presently claimed. Quality Assurance Specialist Katherine Gorgos agreed with the examiner that the refrigerant mixture is obvious over the reference.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.


 Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



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.
10/937,736	09/08/2004	Kenneth M. Ponder	821920-1030	1006

24504 7590 12/17/2007
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
600 GALLERIA PARKWAY, S.E.
STE 1500
ATLANTA, GA 30339-5994

EXAMINER

HARDEE, JOHN R

ART UNIT	PAPER NUMBER
----------	--------------

1796

MAIL DATE	DELIVERY MODE
-----------	---------------

12/17/2007

PAPER

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.

Office Action Summary

Application No.

10/937,736

Applicant(s)

PONDER ET AL.

Examiner

John R. Hardee

Art Unit

1796

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 21-25, 27, 29-31, 33-35 and 37-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 21-25, 27, 29-31, 33-35 and 37-40 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

- | | |
|---|--|
| 1) ☐ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) ☐ Notice of Informal Patent Application |
| 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) ☐ Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-10, 21-25, 27, 29-31, 33-35 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 chlorofluorocarbons (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. The examiner takes the position that "naphthenic mineral oil" has a genus-species relationship with the lubricant recited in claim 2, so its use would be obvious over the

disclosure in the absence of unexpected results. 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. This reference differs from the claimed subject matter in that it does not disclose a composition which reads on applicant'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 applicants 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).

3. 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.

Application/Control Number:
10/937,736
Art Unit: 1796

Page 4

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).

A handwritten signature in black ink, appearing to read "J. Hardee", with a stylized, cursive script.

John R. Hardee
Primary Examiner
December 13, 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Docket No.: 821920-1030

PONDER, K., et al.,

Art Unit: 1796

Serial No.: 10/937,736

Examiner: John R. Hardee

Filing Date: September 8, 2004

Confirmation No.: 1006

For: **Refrigerant with Lubricating Oil for Replacement of R-22 Refrigerant**

RESPONSE AND AMENDMENT

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

Sir:

The non-final Office Action, Paper No./Mail Date 20071213, from Examiner John R. Hardee of Art Unit 1796, mailed December 17, 2007, has been received and carefully reviewed. Applicants respectfully request reconsideration and withdrawal of the rejections presented in the Office Action in view of the following remarks and amendment. No new matter and, thus, no new issues are presented.

AUTHORIZATION TO DEBIT ACCOUNT

It is not believed that any extensions of time or fees are required, beyond those which 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 CLAIMS

Please amend the claims to read as follows wherein changes in a claim are shown by double brackets for deleted matter and underlining for added matter:

1. (Currently amended) In an apparatus designed for use with chlorodifluoromethane refrigerant, the improvement comprising substituting the chlorodifluoromethane with a refrigerant composition containing a lubricant, the refrigerant composition comprising a combination of refrigerant gases and non-refrigerant gas components,

(a) said refrigerant gases consisting of:

about 40% to about 45% by weight tetrafluoroethane; and

about 55% to about 60% by weight[[; and]] pentafluoroethane; and

(b) said non-refrigerant gas components including about 0.5% up to about 20% by weight of the refrigerant gases a lubricating oil that is soluble in chlorodifluoromethane, pentafluoroethane and tetrafluoroethane,

wherein the lubricating oil is selected from the group consisting of napthenic based lubricants, paraffinic based lubricants, and mixtures thereof, mineral oil, polyol ester, synthetic alkyl aromatic lubricants, synthetic alkyl aromatic lubricants mixed with mineral oil, and synthetic alkyl aromatic lubricants mixed with polyol ester.

2. (Original) The invention according to Claim 1, the lubricating oil having the following components:

65-88% hydrotreated light napthenic distillate, and

10-20% solvent refined light napthenic distillate petroleum.

3. (Previously presented) The invention according to claim 1 wherein in the substitute refrigerant said pentafluoroethane is present in the ratio of about 60% by weight to said tetrafluoroethane present in an amount of about 40% by weight.

4. (Previously presented) The invention according to claim 1 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. (Previously presented) The invention according to claim 1 wherein in the substitute refrigerant said pentafluoroethane is present in the ratio of about 55% by weight to said tetrafluoroethane present in an amount of about 45% by weight.