



US 20150051130A1

(19) **United States**

(12) **Patent Application Publication**
Blizzard

(10) **Pub. No.: US 2015/0051130 A1**

(43) **Pub. Date: Feb. 19, 2015**

(54) **HEAT PUMP ADDITIVE PROVIDING
ENHANCED EFFICIENCY**

(52) **U.S. Cl.**
CPC **C10M 137/02** (2013.01)
USPC **508/421**

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(21) Appl. No.: **13/967,854**

(22) Filed: **Aug. 15, 2013**

Publication Classification

(51) **Int. Cl.**
C10M 137/02 (2006.01)

(57) **ABSTRACT**

Improvements in the efficiency of heat pump systems including refrigeration units, heating and air conditioning systems and the like using a composition that is a pump oil comprising at least a compressor oil and, a material selected from the group consisting of an organic phosphate and mixtures of organic phosphates and, a hydrotreated heavy naphthenic distillate.

HEAT PUMP ADDITIVE PROVIDING ENHANCED EFFICIENCY

FIELD OF THE INVENTION

[0001] This invention deals with improvements in the efficiency of heat pump systems including refrigeration units, heating and air conditioning systems and the like.

BACKGROUND OF THE INVENTION

[0002] For many years, efforts have been made to improve the energy efficiency of heating and cooling units which function on the heat pump principle.

[0003] Once such improvement can be found in U.S. Pat. No. 4,963,280, that issued on Oct. 16, 1990 to Wilkins, et al in which there is disclosed a method of improving the efficiency of a heat pump system by introducing into the pump's oil system a polar compound which is liquid under said system's operating conditions. The problem with the method is that the polar compound has chlorine in it which eventually is displaced from the compound by the presence of water, which chlorine is destructive to the metal components of the pump.

THE INVENTION

[0004] Thus, what is disclosed and claimed herein is an additive for compressor pump oil providing enhanced efficiency to the pump. The pump oil comprises a compressor oil and, a material selected from the group consisting of an organic phosphate and mixtures of organic phosphates and, a hydro-treated heavy naphthenic distillate. As used herein, "organic phosphates" means all valence states of phosphorus, including phosphates and phosphites.

[0005] In addition, the compressor oil can also contain polycarboxylate based natural fatty acids or mixtures of polycarboxylate based natural fatty acids, antioxidants, mixtures of antioxidants, corrosion inhibitors, mixtures of corrosion inhibitors, non-ferrous metal deactivators, and, mixtures of non-ferrous metal deactivators.

[0006] What is preferred in this invention is an oil containing a compressor oil and a material selected from the group consisting of: organic phosphates or mixtures of organic phosphates; at least one hydrotreated heavy naphthenic distillate; at least one polycarboxylate based natural fatty acid; at least one antioxidant; at least one corrosion inhibitor, and, at least one non-ferrous metal deactivator.

DETAILED DESCRIPTION OF THE INVENTION

[0007] The present invention deals with improvements in the efficiency of heat pump systems. Such systems include, for example, centrifugal compressors, diagonal or mixed-flow compressor, axial-flow compressors, reciprocating compressors, rotary screw compressors, rotary vane compressor, scroll compressors, diaphragm compressors, air bubble compressor, and hermetically sealed, open, or semi-hermetic compressors. There are two main compressor types, namely, positive displacement and dynamic. The dynamic contains centrifugal and axial pumps, and the positive displacement has two kinds, reciprocating and rotary. The reciprocating variety contains diaphragm, double acting and single acting and the rotary contains lobes, screw, liquid ring, scroll and vane pumps.

[0008] In particular, this invention deals with compressible fluids that are used in such pumps. Most early prior art commonly used materials for this application were Freon® (Dupont) and ammonia. Today, more and more compressible

fluids are used in such pumps. In order to prolong the usefulness of such fluids, additives are put into the fluids.

[0009] The fluids (oils) of this invention are comprised of conventional oils for this use. The inventor herein has discovered that the addition of organic phosphates or mixture of organic phosphates, in conjunction with hydrotreated heavy naphthenic distillates provide useful fluids.

[0010] As noted Supra, the "phosphates" useful herein can be phosphates and/or phosphites and one such phosphate is, for example, Doverphos 613 Alkyl (C12-C15) bisphenol A Phosphite sold by Dover Chemical Co., Dover, Ohio, USA. Dover also supplies Doverphos 253, Dioleyl hydrogen phosphite.

[0011] The materials are merely blended together to create the inventive compositions described herein.

EXAMPLES

[0012]

	A	B	C	D	E	F
58NR ^a	20	50	80			
54NR ^a				20	50	80
613	1	2	4	1	2	4
WF-68	80	50	20	50	50	20
Doverphos 253						
AR-GLO/E						
RC-8100						
RC-9308						
Performance Stability @ ambient	Excell.	2 phase	2 phase	Excell.		

	G	H	I	J	K	L	M
58NR ^a							
54NR ^a							
613	100						
WF-68	100	90	50	20	90	50	20
Doverphos 253	4	4	4	4	4	4	4
AR-GLO/E	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RC-8100		10	50	80			
RC-9308					10	80	80
Performance Stability @ ambient	Ex.					Ex.	Ex.

Product	Description	Manufacturer
AR Glo/E	a universal dye formulated for polyol ester systems	Spectroline Products
58NR ^a	Chlorinated Olefin, 56% chlorine	Dover Chemical Co.
54NR ^a	Chlorinated Olefin, 54% chlorine	Dover Chemical Co.
Doverphos 613	Alkyl (C12-C15) bisphenol A Phosphite	Dover Chemical Co.
WF-68	C-15-C-50 hydrotreated heavy naphthenic distillates	Chevron Products Co.
Doverphos 253	Dioleyl hydrogen phosphite	Dover Chemical Co.
RC-8100	Polycarboxylate based on natural fatty acids	RheinChemie Co.
RC-9308	Combination of anti-oxidents, corrosion inhibitors and non-ferrous metal deactivators	RheinChemie Co.

^a prior art compositions

Stability Aging at Ambient (23 C/50% R.H.) for 2+ years

Performance

[0013] A York Model water-cooled, self-contained air conditioner of 3.3 ton cooling capacity, powered by a 3.0 horsepower compressor driven by a 208/220 v, three phase, 60 hertz electric motor was used. A hermetically sealed compressor with condenser, expansion valve, evaporator and attendant Freon R-22 control system was used for performance testing. The York system contained 0.875 gallons of York "C" oil. The amount of product added to the York C oil was 2.5% additive to the oil in the system.

[0014] The KWH consumed by the inventive compositions over time was significantly reduced compared to the control.

What is claimed is:

1. An oil having enhanced efficiency, said oil comprised of
 - a. compressor oil;
 - b. a material selected from the group consisting of:
 - i. an organic phosphate and
 - ii. a mixture of organic phosphates, and,
 - c. a hydrotreated heavy naphthenic distillate.

2. The oil as claimed in claim 1 wherein, in addition, there is present a material selected from the group consisting of:
 - i. a polycarboxylate based natural fatty acid and
 - ii. a mixture of polycarboxylate based natural fatty acids.
3. The oil as claimed in claim 1 wherein, in addition, there is present a material selected from the group consisting of:
 - i. an antioxidant, and,
 - ii. a mixture of antioxidants.
4. The oil as claimed in claim 1 wherein, in addition, there is present a material selected from the group consisting of:
 - i. a corrosion inhibitor and,
 - ii. a mixture of corrosion inhibitors.
5. The oil as claimed in claim 1 wherein, in addition, there is present a material selected from the group consisting of:
 - i. a non-ferrous metal deactivator and,
 - ii. a mixture of non-ferrous metal deactivators.
6. A oil having enhanced efficiency, said oil comprising:
 - a. a compressor oil;
 - b. a material selected from the group consisting of:
 - an organic phosphate and
 - a mixture of organic phosphates, and,
 - c. at least one Hydrotreated heavy naphthenic distillate;
 - d. at least one polycarboxylate based natural fatty acid;
 - e. at least one antioxidant;
 - f. at least one corrosion inhibitor, and,
 - g. at least one non-ferrous metal deactivator.

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