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(54) **Lubricating oil composition.**

(57) A lubricating oil composition comprising a major amount of liquid paraffin as a lubricating base oil and about 0.01 to 1.0 % by weight based on the total amount of the lubricating oil composition of a saturated fatty acid having 12 to 22 carbon atoms as an essential component.

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Background of the Invention(1) Field of the Invention

5 This invention relates to a lubricating oil composition for machineries such as compressors and the like.

(2) Description of the Prior Art

10 Compressed air used in association with health, for example, used in food and medicine manufacturing plants or in the instruments for medical facilities, is usually produced by means of a combination apparatus of an oil cooling compressor and an oil mist filter-type compressor. The oil mist filter-type compressor is rarely employed in small and medium-sized manufacturing plants or in medical facilities, because the production costs of compressed air is almost twice the costs of that produced by an oil cooling compressor. These higher costs are due to the fact that the minimum economical capacity is about 15 KW.

15 Examples of the fields in association with health in which compressed air is utilized include those in manufacture of food such as ice cream for stirring purposes, food treating facilities to skin vegetables such as onions by instantaneously blowing off the skin, breweries of bean paste and the like for stirring purposes, bottling of food such as soft drinks and beverages to blow off overflows, washing of bottles, transportation of powdery matters such as sugar, in portable air drills as an air source and for cleaning the throat for
20 dentistry, and the like.

In case of a combination of an oil cooling compressor and an oil mist filter-type compressor, traces of oil mists, in an amount of several to several tens of ppm, may inevitably leak out of the system because of the difficulty of complete removal of the oil mists in the compressed air over an extending period of time.

25 Screw-type compressors have been commonly employed for the production of dried ice in medium to large scale plants to compress carbon dioxide. In this case, the lubricating oil used is strictly selected from the group consisting of innocuous lubricating oils in due consideration of being harmless to the human body because said lubricating oil is used under direct contact with the carbon dioxide gas. At the same time, the lubricating oil is further required to have antioxidation properties because a very small amount of air may be mixed in with the carbon dioxide gas.

30 Therefore, as for compressor lubricating oils for such uses, severely selected and innocuous lubricating oils such as animal and vegetable oils and liquid paraffins have been used. However, animal and vegetable oils and liquid paraffins are insufficient in rust prevention effects and antioxidation properties. Under the existing conditions, it is impossible to find such innocuous lubricating oils on the market which are safe for equipment and have excellent antioxidation properties and rust preventing performances as well.

35 The present invention is based on finding that a remarkable improvement in performances such as lubrication, rust prevention, and oxidation stability of an innocuous lubricating oil can be attained by incorporation of a specific compound in a specific amount into a liquid paraffin-based lubricating base oil.

3. Summary of the Invention

40 An object of the present invention is to provide an innocuous lubricating composition having improved lubricating properties, rust inhibiting properties, oxidation stability. More particularly, the present invention is to provide a lubricating composition comprising a major amount of liquid paraffin as a lubricating base oil and about 0.01 to 1.0 % by weight based on the total amount of the lubricating oil composition of saturated
45 fatty acids having 12 to 22 carbon atoms as an essential component.

4. Detailed Description of the Invention

50 In the present composition, a liquid paraffin is employed as the lubricating base oil wherein the liquid paraffin having a kinematic viscosity of 7 to 160 cSt at 40 °C is preferred.

An example of preferable liquid paraffins includes a highly refined light lube cut obtained from crude oil by vacuum distillation followed by sulfuric acid treating.

55 As for the saturated fatty acids having 12 to 22 carbon atoms, natural fatty acids or synthetic fatty acids may be employed, both straight and branched chain fatty acids are usable. Examples of the saturated fatty acids include straight and branched chain fatty acids such as lauric acid, dodecylic acid, myristic acid, pentadecylic acid, palmitic acid, heptadecylic acid, stearic acid, nonadecanoic acid, arachic acid, and mixtures thereof. Among them, C₁₄, C₁₆, C₁₈ or C₂₀ fatty acid, and mixtures thereof are preferred. When saturated fatty acids other than the acids having 12 to 22 carbon atoms or unsaturated fatty acids are

employed in the place of the saturated fatty acids having 12 to 22 carbon atoms, performances such as oxidation stability and lubrication are unsatisfactory.

These fatty acids of the present invention have been designated as odorants in the legal definition of the term "food additives" and sorted into one of the standard raw materials used in the production of cosmetics and it is clear that they are perfectly innocuous to the human body. Said C₁₂ to C₂₂ saturated fatty acids are in an amount of about 0.01 to 1.0 % by weight based on the total amount of the composition, preferably about 0.01 to 0.5 % by weight. When the content is less than 0.01, performances such as oxidation stability, rust prevention and lubrication are insufficient, and there is no reward to incorporate the acids in an extra amount beyond the range.

According to the composition aspects of the present invention, a lubricating oil composition having various improved performances may be provided by incorporation of saturated fatty acids having 12 to 22 carbon atoms as an essential component with a major amount of liquid paraffin as the lubricating base oil.

However, dibutyl hydroxytoluene and/or tocopherol (Vitamin E) may be added further to improve the lubricating performances in the present composition.

Examples of Dibutyl hydroxytoluene and/or tocopherol (Vitamin E) include 2,6-di-tert-butyl-4-hydroxytoluene, α -tocopherol, β -tocopherol, γ -tocopherol, δ -tocopherol, and mixtures thereof.

These substances have been also designated as antioxidants in the legal definition of the term "food additives", and are completely harmless to human body.

Dibutyl hydroxytoluene and/or tocopherol is in an amount of 0.0001 to 5.0 % by weight, preferably 0.001 to 2.0 % by weight, more preferably 0.001 to 0.1 % by weight based on the total amount of the composition.

In order to further improve the lubricating performances of the present invention, various other additives may be optionally used, in so far as they are not harmful to the human body.

Examples of such innocuous additives include higher fatty alcohols such as oleyl alcohol, animal and vegetable fats and oils including their partially hydrogenated products, higher fatty acid esters such as methyl laurate and butyl stearate as an oiliness improver, tert-butyl-hydroxyanisole as an antioxidant, sorbitan fatty acid esters such as sorbitan monooleate, sucrose fatty acid esters such as sucrose monolaurate and the like as a corrosion inhibitor, and mixtures thereof.

Although the amount is optional, these other additives are usually in an amount of less than about 20.0 % by weight respectively, preferably about 0.1 to 10.0 % by weight based on the total amount of the composition, said amount not being limited.

(Examples)

In order to further illustrate the composition of the present invention, the following examples are provided. It will be understood that the examples as hereinafter set forth are provided for illustrative purposes and are not intended to limit the invention as herein disclosed and as set forth in the claims.

Examples 1 to 6 and Comparative Example

According to the compositions listed in Table 1, the lubricating compositions (Examples 1 to 6) of the present invention were prepared. Performance tests were carried out for these compositions by the following methods and the test results are set forth in Table 1. A blank test was run with a sample consisting of the same liquid paraffin used as the base oil, and the results are also set forth in Table 1

(Antiwear test):

According to ASTM D 4172 "WEAR PREVENTIVE CHARACTERISTICS OF LUBRICATING FLUID (FOUR-BALL METHOD)", the wear scratches (mm) of the samples were measured at a speed of 1,200 r.p.m., a load of 15 kg and a duration of 30 minutes.

(Rust preventing test)

According to JIS K 2510 "RUST INHIBITING TEST FOR LUBRICATING OIL", the rust inhibiting performances were evaluated.

(Oxidation stability test)

According to JIS K 2514 3.3 " OXIDATION STABILITY TEST FOR LUBRICATING OIL BY ROTARY BOMB METHOD", the life times (min.) of the samples in an oxidation atmosphere were measured at a temperature of 120 °C.

Table 1

Composition (Wt. %)	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Comp. Example
C ₁₈ fatty acid	0.1	-	-	-	-	-	-
C ₁₈ fatty acid	-	0.1	-	0.1	0.1	0.1	-
C ₂₀ fatty acid	-	-	0.1	-	-	-	-
Dibutyl hydroxy-toluene	-	-	-	0.01	-	-	-
Tocopherol	-	-	-	-	0.01	1.0	-
HYWHITE D260 ¹⁾	balance	balance	balance	balance	balance	balance	100
Wear test (average scratches mm)	0.42	0.40	0.40	0.40	0.40	0.39	0.56
Rust preventing test after 1 hr.	none	none	none	none	none	none	rust all over
after 12 hr.	rust very small	rust very small	rust very small	rust very small	rust very small	rust very small	rust all over
Oxidation stability test Life (min.)	510	550	570	2100	1600	5400	340

¹⁾ Liquid paraffin (trade name; made by Nippon Oil Co., Ltd.) (50 cSt @ 40°C)

As described above, the lubricating compositions of the present invention have improved performances

of lubrication, rust prevention and antioxidation, and are completely innocuous to the human body.

Claims

- 5 1. A lubricating oil composition comprising a major amount of liquid paraffin as a lubricating base oil and about 0.01 to 1.0 % by weight based on the total amount of the lubricating oil composition of a saturated fatty acid having 12 to 22 carbon atoms as an essential component.
- 10 2. The lubricating oil composition according to Claim 1 wherein said composition comprising further about 0.0001 to 5.0 % by weight based on the total amount of the lubricating oil composition of dibutyl hydroxytoluene and/or tocopherol.
- 15 3. The lubricating oil composition according to Claim 1 or 2 wherein said saturated fatty acid selected from the group consisting of C₁₄, C₁₆, C₁₈, and C₂₀ saturated fatty acids and mixtures thereof.
- 20 4. The lubricating oil composition according to Claim 1,2 or 3 wherein said composition is a compressor lubricating oil.

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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 8587

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 590 451 (G.L.PERRY) * column 3, line 7 - column 4, line 7 * column 6, line 1 - line 63 * - - -	1,3	C 10 M 169/04
A	DE-B-1 039 174 (H.P.KAUFMAN) * claim * - - -	1-3	
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 218 (C-301)(1941) September 1985 & JP-A-60 81 132 (AKIRA WAKAYAMA) May 9, 1985 * the whole document * - - - - -	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			C 10 M
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 28 August 91	Examiner RO TSAERT L.D.C.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			