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LUBRICATING OIL

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The present invention relates to an improved lubricating oil and, more specifically, to a lubricant of high oiliness and stability and particularly adapted to the lubrication of automotive engines and for other uses where the oil is subjected to high temperatures and pressures.

For some years it has been appreciated that hydrocarbon lubricating oils are not endowed with a high degree of oiliness and that they might be improved by the addition of small amounts of other substances. Fatty and other acids have been suggested but they are corrosive and are clearly objectionable for this reason. Certain ester materials have also been proposed, especially the synthetic esters prepared from the acids of high molecular weight and low molecular weight alcohols. Alcohols of high molecular weight have also been suggested and although these improve the oiliness of the hydrocarbon oil blends to some extent, it has now been found that the best results are obtained with esters of such high molecular weight alcohols, particularly those formed by reaction with acids of relatively low molecular weights.

The present invention deals with hydrocarbon oils containing relatively small amounts of esters which are the products of reaction on the one hand of low molecular weight acids and high molecular weight alcohols. The oil itself is preferably a well refined lubricating oil which may be derived from the various crudes available and may be refined in the usual methods by acid, clay, alkali treatments or by solvent extraction, hydrogenation, destructive hydrogenation and the like. However, untreated distillates, or blends, or even highly treated oils such as "white" oils are within the scope of the invention. Fatty oils or mineral oils containing fatty oils are not excluded. The oil may be waxy in character and may contain pour point inhibitors or it may be totally dewaxed or, if desired, derived from a crude originally free from wax.

The esters which are used in the present compositions may be derived from any particular source; for example, the alcohols which occur in nature may be used, such as lauryl or cetyl, preferably the straight chain aliphatic alcohols containing at least ten carbon atoms. Wool fat alcohols and other vegetable, animal or fish alcohols may also be used. Primary alcohols may be used but secondary and even tertiary alcohols such as those obtained by the sulfation and hydrolysis of cracked wax, petrolatum or oils are quite satisfactory for the purpose. It is also unnecessary that they should be fully saturated, oleyl alcohol being substantially equivalent to stearyl for the purpose of this invention.

If desired, a single alcohol may be used, but in most cases mixtures of alcohols of different molecular weights will be employed. Such alcohols are made available by the reduction of organic acids or fats as, for example, by the method described in the Lazier patent, U. S. 1,839,974. Suitable alcohols may also be produced by the direct oxidation of hydrocarbon materials, particularly paraffin wax, petrolatum, or mineral oils. Dependent on the conditions and the catalyst used, the oxidation products should be predominantly acids or alcohols; for example, the former are largely produced when heavy metal soap catalysts are used, whereas the latter are largely produced with catalysts containing boric acid. The total oxidation product in any case, will usually contain both acids and alcohols and while the alcohols may be separated from the mixture, it has been found possible to directly reduce the acid constituents, converting the same to alcohols which may be esterified in the usual manner. In many cases high molecular weight polyalcohols such as for example, 7–18 stearylene glycol produced by the hydrogenation of castor oil, or even substituted high molecular weight alcohols e. g. amino alcohols, halo alcohols, sulfo alcohols, phenyloctadecyl alcohol, etc. may be advantageously employed. The preferred molecular weight of the alcohol lies between about 120 to 350, although this is merely an approximate value.

The acid constituent of the esters producing the best results are the low molecular weight organic acids having preferably less than ten carbon atoms to the molecule. In fact it has been found that the acids with less than four or five carbon atoms are the most desirable and, for reasons of economy, acetic acid is the most suitable. It will be understood, however, that while formic or acetic acid is preferred, other low molecular weight saturated or unsaturated acids, or hydroxy acids may be used. For instance, the low molecular weight fractions of acids obtained by oxidation of oils and/or waxes may be employed for this purpose. Aliphatic acids are most desirable, although in many instances cyclic acids such as aromatic or naphthenic acids or their substituted equivalents may be conveniently employed.

The esters so produced are preferably to be liquids having boiling points above 150° C., and preferably above 200 or 250° C. It is desirable to employ those normally liquid at room temperatures, although solid esters may be utilized. Those having melting points above about 40 or 60° C. are less desirable because they would raise the pour point of the oil. It is preferable to have them oil soluble, although this is not the most controlling factor, and partially soluble as well as oil insoluble esters have been found to have value in many instances, when dispersed colloidally or otherwise through the oil.

The amount of the ester used in the present compositions depends to some extent on the service to which the oil is destined and also on the particular ester used. As little as .25% has been known to give a perceptible effect although usually from 1 to 4% is most desirable. In almost all cases of automotive lubrication 2% has been found to give the most satisfactory results, although in some instances amounts approaching 10% and higher have been used. The following example is given to illustrate the value and the effect of the present composition:

In the following tests the oil used was an SAE20 lubricating oil, highly refined and of an excellent quality. To various samples of this base oil was added 2% of the various materials which will be indicated. The particular alcohols were derived from paraffin wax by direct catalytic oxidation with air, the alcohols were purified so as to be free from acids and esters which may be present in the oxidation product. The total alcohol content was found to be made up of two different types (A) which are normally solid, and (B) which are normally liquid. Both groups were of substantially the same molecular weight ranging from about 12 to 20 carbon atoms each to the molecule. For comparison the purified alcohols were added to the base oil and separate samples were esterified with acetic acid and these esters were then added to other samples of the oil. In each case, the addition agent was present in proportion of 2% by weight of the oil.

The following tests were carried out on the Mougey machine which has been described in the National Petroleum News, November 11, 1931, p. 47. The results are as follows:

Oil sample	Load carried	Final friction
	Lb./sq. in.	
Oil (unblended blank)	17,000	Pin sheared
Oil+2% alcohols A	19,000	Do.
Oil+2% liquid alcohols B	21,000	Do.
Oil+2% acetic esters of solid alcohols	25,000	15½ lb. ft.
Oil+2% acetic esters of liquid alcohols	25,000	18 lb. ft.

From the above tests, it will be seen that the blank sample of oil and those samples containing the purified alcohols were unable to carry the full load applied in the test and that the pins were sheared under the high friction. The esterified alcohols, however, were capable of easily carrying the full load of 25,000 lb. per square inch and showed remarkably low friction values. In addition, the friction curves were observed to be smooth, without irregularities and throughout the test the oils remained cool and the test pieces were not seriously discolored.

The present compositions may contain other addition agents for various purposes. For example, it is found that the esterified bodies may be used in conjunction with the action of pour point depressors, dyes, thickeners, oxidation inhibitors of the various types or sludge dispersers, carbon preventers and the like. The oxidation inhibitors particularly preferred are those containing sulphur, especially in the form of thio ethers, or aromatic mercaptans, disulphides or polysulphides and metallo-organics such as lead tetra ethyl or tetra phenyl or the similar compounds of tin, mercury, bismuth, arsenic, antimony and the like metals. Fatty oil blends and blends with volatilized or synthetic oils may also be used.

The present invention is not limited to any theory of the effect of addition agents to lubricating oils, nor to any particular agent described, or the sources from which it is derived, but only to the following claims in which it is desired to claim all novelty inherent in the invention.

What I claim is:

1. An improved lubricating oil comprising a hydrocarbon base and a small amount of a mineral oil soluble synthetic ester produced from a monohydric alcohol containing at least ten carbon atoms and an organic acid of less than ten carbon atoms.

2. Composition according to claim 1 in which the ester is obtained from an aliphatic monohydric alcohol.

3. Composition according to claim 1 in which the ester is obtained from an aliphatic monohydric alcohol and an aliphatic acid.

4. An improved oil composition comprising hydrocarbon oil base and a small amount of a mineral oil soluble synthetic ester obtained on the one hand from an aliphatic mono basic alcohol containing from 10–20 carbon atoms and on the other from an aliphatic acid of less than six carbon atoms.

5. Composition according to claim 4 in which the ester is obtained from a monohydric alcohol derived from paraffin wax by oxidation.

6. Composition according to claim 4, in which the ester is derived from an alcohol produced by the reduction of the carboxyl group of an organic compound containing at least ten carbon atoms.

7. Process according to claim 4 in which the ester is derived from an alcohol obtained by the reduction of acids occurring in natural fatty oils.

8. Composition of matter comprising a hydrocarbon lubricating oil and a synthetic ester derived from a monohydric alcohol obtained by a process selected from the group of wax oxidation, reduction of high molecular weight fatty acids and sulphation and hydrolysis of cracked waxes, and a low molecular weight aliphatic acid.

9. An improved lubricant comprising a hydrocarbon oil and a synthetic ester produced by the union of an aliphatic monohydric alcohol of at least 10 carbon atoms and an aliphatic monobasic acid of less than six carbon atoms, the ester being present in proportion from about .25 to 4% of the oil.

10. An improved lubricant comprising a hydrocarbon oil and a synthetic acetic ester of an aliphatic monohydric alcohol of at least ten carbon atoms, the proportion of ester being from .25% to 4% of the oil.

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