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LUBRICANT AND PROCESS OF
PRODUCING IT

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This invention relates to a lubricant that is produced by mixing an ester with an organic product which may be either a liquid or a solid and has lubricating properties.

It has been known for some time that vegetable oils are more desirable as lubricants than mineral oils apparently because they possess the property of adhering to metal surfaces better than do mineral oils. There are, however, certain disadvantages in the use of vegetable oils as lubricants. Such vegetable oils or fatty substances and especially those that are liquid at ordinary temperatures, contain unsaturated compounds which undergo changes such as oxidation and polymerization, for example, when they are used as lubricants and they also sometimes decompose into substances which may have a deleterious effect on the surfaces that are to be lubricated. Besides, the end products of oxidation and polymerization of such oils or fatty substances are sticky and consequently they retard lubrication rather than aid it.

Another disadvantage about the use of vegetable oils as lubricants is that they are very much more expensive than mineral oils. It has been found that small quantities of fatty material added to mineral oils greatly increase the lubricating qualities of the mineral oil. For example, 1 or 2% of the fatty oil added to the mineral oil increases its lubricating qualities until it approaches vegetable oil as a lubricant. However, the danger of the vegetable oil constituent of the mixture decomposing and forming gums or sticky material is present.

By the present invention a lubricant is produced which surpasses mineral oil lubricants for lubricating purposes and at the same time the cost of the lubricant produced by this invention is not materially greater than that of mineral oil lubricant. Also, the presence of vegetable oils or fatty material which would undergo decomposition and give rise to troubles such as formation of gum and producing stickiness, are obviated.

In carrying out this invention esters of aliphatic acids are formed and these esters are mixed or compounded with an organic product of lubricating character with which the esters will form a solution. The aliphatic acids that are esterified for this purpose should contain at least eleven carbon atoms and are found in large quantities in vegetable oils. Some of the aliphatic acids which may be mentioned as suitable for this purpose are: oleic acid, stearic acid, ricinoleic acid, linolic acid and others which are commonly found in vegetable oils. The esters may be either

methyl, ethyl, propyl, isopropyl, butyl, isobutyl, amyl, isoamyl, glycol, diethylene glycol, and higher glycols, etc. The alcohols that are used for producing the esters to be used in this invention should not have more than two hydroxyl groups, or the residue thereof should have a valency less than 3.

The esterification of the aliphatic acids may be carried out in any of the well known ways that are in common use.

The esters described above may be completely distilled in the same way as mineral oils may be distilled without leaving voluminous residues, as is the case with the distillation of vegetable oils. When these esters are burned or undergo combustion, as for example in the cylinders of internal combustion motors, very little, if any, soot or carbon deposition takes place as compared with the amount of such soot or carbon deposition that is left when mineral oils are burned.

The following are given as specific examples of obtaining esters which may be used for making the lubricants by mixing or compounding them with organic products which with them form solutions, such, for example, as hydrocarbons having boiling points above 100° C., or lubricating mineral oils, but it is to be understood that the examples are for illustrative purposes, as esters of practically all aliphatic acids that have more than five carbon atoms, and the other residue of which esters have a valency less than three are suitable for use in this invention:

Example I.—Equal volumes of coconut oil and methyl alcohol or other alcohols having less than three hydroxyl groups are mixed using 1% of sulphuric acid as a catalyst and esterification is caused to take place in the well-known way.

Example II.—Equal volumes of cotton seed oil and ethyl or other alcohols having less than three hydroxyl groups are mixed with about 1% of sulphuric acid as a catalyst and esterification is caused to take place.

Example III.—Equal volumes of ricinoleic acid and methyl alcohol or other alcohols having less than three hydroxyl groups are mixed with 1% of sulphuric acid as a catalyst and esterification is caused to take place.

Example IV.—Equal weights of alkyl chlorides such as amyl chloride, etc. are mixed with a sodium salt of the fatty acid to be esterified, such as sodium ricinoleate, and the proper amount of concentrated sulphuric acid is added to cause esterification to take place.

Example V.—Ethylene dichloride is mixed with an equal amount of the sodium salt of oleic acid

and the proper amount of sulphuric acid is added to cause esterification to take place.

It is known that esters can be formed by using other products and other catalysts than those mentioned in the examples. Such esters are also suitable for use in this invention if they are of the sort mentioned above.

Any one or more of the esters produced in the examples given above or produced in other ways is mixed with an organic product such as lubricating mineral oil with which the ester forms a solution thereby producing a lubricant that has excellent lubricating properties and is not materially more expensive than the lubricating mineral oil itself. The proportion of the ester to the other lubricant can be varied over very wide ranges. In view of the fact that the ester is usually more expensive than the mineral oil, it is desirable to have the proportion of ester in the mixture as small as can be used and still procure the advantages of this invention. It has been found that when as little as 0.5% of ester by weight as compared to the mineral oil is used, very surprisingly beneficial results are obtained. Among these results may be mentioned that the internal friction of the lubricant is greatly diminished, the ability of the lubricant to wet the surfaces of the metal is increased far out of proportion to the amount of ester present, and the tendency for the mineral oil to distil off of the surfaces when the temperature increases is greatly diminished.

Although striking and remarkable advantages are obtained by adding very small amounts of the esters to the lubricating mineral oil, larger amounts can be added and still obtain excellent results, although the expense is thereby increased. The lubricant produced by this invention varies all the way from a very small percentage of ester to mineral lubricating oil up to the proportion of having only a small amount of lubricating oil present, the remainder being esters.

I claim:

1. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester derived from a long chain aliphatic acid and a short chain aliphatic alcohol having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

2. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of a long chain aliphatic acid and a short chain aliphatic alcohol having not more than 2 hydroxyl groups, the composition being substantially free from fatty oils and the amount of said ester being at least about 0.5% of said lubricant.

3. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of a long chain aliphatic acid and a short chain aliphatic monohydric alcohol, the amount of said ester being at least about 0.5% of said lubricant.

4. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of a long chain aliphatic acid and an aliphatic alcohol of less than 6 carbon atoms and having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

5. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of an aliphatic acid of more than 5 carbon atoms and a short chain aliphatic alcohol having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

6. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of an aliphatic acid of more than 5 carbon atoms and a short chain aliphatic alcohol of less than 6 carbon atoms having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

7. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of an aliphatic acid of at least 11 carbon atoms and a short chain aliphatic alcohol having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

8. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of an aliphatic acid of at least 11 carbon atoms and a short chain aliphatic alcohol of less than 6 carbon atoms having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

9. A lubricating oil comprising in combination a hydrocarbon oil and a small quantity of ethyl oleate.

10. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of ricinoleic acid and a short chain aliphatic alcohol having not more than 2 hydroxyl groups.

11. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of stearic acid and a short chain aliphatic alcohol having not more than 2 hydroxyl groups, the amount of said ester being at least about 0.5% of said lubricant.

12. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester of oleic acid and a short chain aliphatic alcohol having not more than 2 hydroxyl groups.

13. A lubricant comprising a major proportion of mineral oil and a minor proportion of an ester derived from ricinoleic acid and a monohydric alcohol of less than 6 carbon atoms.

14. A lubricant comprising a mineral oil and an ester of a monobasic acid such as commonly found in vegetable oils and the residue of a monohydric alcohol, said acid having at least eleven carbon atoms, the amount of said ester being at least about 0.5% of said lubricant.

15. A lubricant comprising a major proportion of mineral oil and a minor proportion of a methyl ester derived from stearic acid.