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LUBRICANT

Bert H. Lincoln, Ponca City, and Alfred Henriksen, deceased, late of Ponca City, Okla., by John W. Wolfe, administrator de bonis non, Ponca City, Okla., assignors, by mesne assignments, to The Lubri-Zol Development Corporation, Cleveland, Ohio, a corporation of Delaware

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18 Claims. (Cl. 87—9)

This application is a continuation in part of application Serial No. 625,190 filed July 27, 1932, now Patent No. 2,087,803, of July 20, 1937.

Our invention relates to lubricants and more especially to compositions for use where unusually high pressures may be encountered. More specifically, this invention relates to greases (i. e., lubricants comprising a lubricating oil and a soap, in various proportions) so treated as to exhibit marked increase in film strength or extreme pressure characteristics.

At the present time the trend in the design of internal combustion engines, gears, etc., is toward ever increasing pressure per unit area of contact surface and as a result there is a persistent demand for greases and other lubricants which will function satisfactorily under such conditions. It is an object of this invention to provide such a lubricant.

By "extreme pressures" are meant pressures of or in excess of about 10,000 lbs. per square inch, such pressures being now encountered in hypoid gears, bearings, contact surfaces of piston rings and cylinders of internal combustion engines. Diesel and aviation engines are especially in need of extreme pressure lubrication.

Another object is to provide a method of lubricating relatively moving metallic parts especially under conditions of extreme pressure by adding certain halogen-bearing compounds to the composition.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the steps hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain approved methods of carrying out the invention, such disclosed methods, however, constituting but certain of the various ways in which the principle of the invention may be used.

Broadly stated, this invention contemplates the use in lubricating compositions of metallic salts of halogenated naphthenic acids. If a liquid composition is desired, for the crankcase of an internal combustion engine, for example, it is obvious that too large a quantity of the soap may not be added. Since, however, the presence of but a small amount of the halogen is effective to afford extreme pressure characteristics, liquid lubricants may be prepared which are entirely satisfactory. Thus, the proportion of halogenated naphthenic soaps in the lubricant may range from about 1% or less up to about 60% to provide lubricants for every need, including liquid and solid greases. Indeed, as little as 0.1% of the halogen-bearing soap is often sufficient to appreciably improve the extreme pressure characteristics of a lubricant.

It is believed that the salts of the halogenated naphthenic acids have a chemical or physico-chemical effect on the metallic surfaces being lubricated, but it is not intended that this invention be limited by any explanation or theory concerning the reason for their effectiveness.

Salts made from halogenated mixtures of naphthenic acids commercially available are generally entirely satisfactory and, indeed, may often be preferred due to enhanced solubility in the oil and uniform quality of product. Also, such mixtures are generally much less expensive to purchase on the market.

The halogen may be added to the naphthenic acids by any of the known methods and this invention is not concerned with the particular method employed. The degree of halogenation may be varied over wide limits and the amount of the salt added to the lubricant will to some extent depend upon the proportion of halogen it contains. All of the halogens are suitable for use in accordance with this invention, but chlorine is the cheapest and very effective. Fluorine, bromine, and iodine are also effective but are more expensive and not commercially available in such quantities as chlorine.

An example of a lubricant blended in accordance with the present invention is the following:

	Percent
Lead soap made from chlorinated naphthenic acids	20
Black oil (either 110 @ 210 viscosity or 190 @ 210 depending on whether for summer or winter use)	80

The above is of course a grease, but liquid compositions may be obtained by using much smaller proportions of the soap, the halogen content being preferably quite high.

The various other metals commonly employed in making soaps for use in greases are entirely satisfactory for making the greases of this invention, for example:

Alkali metals—Na, K.
Alkaline earth metals—Ca, Ba, Sr, Mg.
Such metals as Zn, Al, Cd, Pb, Cr.

While, as indicated, mineral oil is generally the principal ingredient of our lubricant, it is not essential that it be the only ingredient, other than

our addition agent, provided that there should be no additional ingredient which is incompatible with such addition agent. It is within the contemplation of this invention to include, if necessary or desirable, such other addition agents as are commonly added to improve the viscosity index or cold test of the lubricant and a lubricating composition according to this invention which also has a separate oiliness increasing agent has been found to be unusually effective.

Among the advantages derived from use of the addition agents of this invention in lubricants are lowered friction, freedom from scoring, and generally reduction in wear is noted.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the process herein disclosed or the materials employed in carrying out the process, provided the ingredient or ingredients stated by any of the following claims, or the equivalent of such stated ingredient or ingredients, be employed.

We therefore particularly point out and distinctly claim as our invention—

1. A lubricating composition comprising a lubricating oil and a metallic salt of a halogenated naphthenic acid.

2. A lubricating composition comprising a lubricating oil and a mixture of metallic salts of various halogenated naphthenic acids.

3. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a metallic salt of a halogenated naphthenic acid.

4. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a mixture of metallic salts of various halogenated naphthenic acids.

5. A lubricating composition comprising a lubricating oil and a metallic salt of a chlorinated naphthenic acid.

6. A lubricating composition comprising a lubricating oil and a mixture of metallic salts of various chlorinated naphthenic acids.

7. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a metallic salt of a chlorinated naphthenic acid.

8. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a mixture of metallic salts of various chlorinated naphthenic acids.

9. A lubricating composition comprising a lubricating oil and a lead soap of a halogenated naphthenic acid.

10. A lubricating composition comprising a lubricating oil and an aluminum soap of a halogenated naphthenic acid.

11. A lubricating composition comprising a lubricating oil and a calcium soap of a halogenated naphthenic acid.

12. A lubricating composition comprising a lubricating oil and a lead soap of a chlorinated naphthenic acid.

13. A lubricating composition comprising a lubricating oil and an aluminum soap of a chlorinated naphthenic acid.

14. A lubricating composition comprising a lubricating oil and a calcium soap of a chlorinated naphthenic acid.

15. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a lead soap of a chlorinated naphthenic acid.

16. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of an aluminum soap of a chlorinated naphthenic acid.

17. A lubricating composition comprising a lubricating oil and from about 0.1% to about 60% of a calcium soap of a chlorinated naphthenic acid.

18. A lubricating composition comprising a lubricating oil and a small amount, on the order of 1%, of a metallic salt of a halogenated naphthenic acid.

BERT H. LINCOLN.
JOHN W. WOLFE,
Administrator de bonis non of the Estate of Alfred Henriksen, Deceased.