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PETROLEUM LUBRICANT PRODUCT

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2 Claims. (Cl. 87—9)

This invention is specifically directed to petroleum lubricant products capable of maintaining lubricant films under conditions of extremely high unit pressure, known as E. P. (extreme pressure) lubricants.

The lubrication of machine parts, such as for example the hypoid gears used in automotive power transmission, wherein high unit pressures are combined with high rubbing speeds is beyond the capabilities of ordinary mineral lubricants alone. It is common practice to produce extreme pressure lubricants by the addition to mineral oils of such substances as free sulphur, chemically bound sulphur as found in sulphurized fatty oil, chlorinated aromatic hydrocarbons with or without fatty oils, esters of various acids of phosphorus, as well as combinations of some of the above, or combinations of metallic soaps and sulphurized oils. Some of these materials are not suitable where pressures are in excess of 2,000 pounds per square inch and thus are not satisfactory for heavy duty such as in hypoid gears on buses and trucks. Some have a pronounced tendency to form sludge on standing or in service, some have too short a life span to permit of commercial use, and some separate in service or storage to form products highly corrosive to containers and equipment to be lubricated.

The object of this invention is to provide extreme pressure lubricants containing a novel and effective characterizing ingredient which gives high lubricating power, is stable in service and storage, and which is not highly corrosive to the materials in contact with which it is stored and used.

This invention is based upon the discovery that these objects may be attained by blending with mineral oils a substance obtained by the reaction of chlorinated hydrocarbons which are largely aliphatic in nature with potassium ethyl xanthate.

Chlorinated aromatic materials such as chlorinated naphthalene and chlorinated diphenyl have been used as E. P. ingredients. These materials are too high in stability to readily yield chlorine under conditions of use and alone are ineffective for the higher levels of pressure. Chlorinated aliphatic materials are too unstable, and while highly effective as E. P. ingredients decompose readily to products corrosive to containers and equipment lubricated and so are not commercially usable.

This invention is based upon the discovery that chlorinated aliphatic compounds may be reacted with potassium xanthate to produce stable and effective E. P. ingredients of non-corrosive nature.

To explain the nature of this invention, the preparation of a "xanthochlornaphtha" will be described. A chlorinated naphtha was first prepared by chlorinating petroleum napntna until it contained about 54% by weight of chlorine. Two hundred parts of this were dissolved in about 500 parts of acetone, and placed in a reaction vessel heated by a water jacket and equipped with stirrer and reflux condenser. Then 120 parts of potassium xanthate were added, and the mixture held at the boiling temperature, with stirring, under reflux, for about 2 hours. The resulting mixture was cooled to room temperature, filtered, and the filtrate subjected to distillation to remove the acetone. After removal of acetone, the product was washed to remove potassium salts, dried, and filtered. The finished reaction product was a dark brown liquid, containing about 12% of sulphur and 37% of chlorine. Then 254 parts of product were recovered. Variation in sulphur and chlorine content can be obtained by varying the degree of chlorination of the naphtha and by varying the amount of potassium xanthate used, to give a group of "xanthochlornaphthas" of wide varying compositions. The nature of the light aliphatic hydrocarbon may also be varied, as well as the solvent, which may be ethyl or methyl alcohol.

The term "xanthochlornaphthas" herein used is employed for convenience to designate all of these materials whether the aliphatic starting material be petroleum naphtha (a predominantly aliphatic hydrocarbon) or not.

In 10% concentration in mineral oil such "xanthochlornaphthas" produce excellent extreme pressure lubricants, passing in a satisfactory manner the usual evaluation test used in the art. Actual gear tests show such blends to have good extreme pressure properties without any tendency to form sludge. These blends are not corrosive toward steel, although they will corrode copper under long exposure at high temperature.

To show the efficacy of these oils, the following tests are noted, wherein a blend of mineral oil of 150–160'' Saybolt Universal viscosity at 210° F. and 10% of xanthochlornaphtha was subjected to test in the Almen Pin Test, described by Wolf and Mougey, Proc. A. P. I. 1932, pp. 118–130, and the S. A. E. test described Annon S. A. E. Journal 39, 29–4 (1936), with the following results:

Almen test load limit, lbs.	S. A. E. test load limit, lbs.	
	750 R. P. M.	1,000 R. P. M.
30,000+	580+	470
30,000+	----------	430

In actual test with a hypoid gear loaded at 3500 pounds per linear inch of tooth, built up

from 0 pounds in 35 seconds and held for two hours, only very slight scratches appeared upon the gear faces. Most other so-called E. P. lubricants, including the lead soap-sulphur compounds, score the gears badly under the same test.

These "xanthochlornaphthas" may be used for the purposes of this invention in concentration of from 1 to 20% of the mixture. It is preferred to use about 10%.

We claim:

1. A lubricant product for use where high unit pressures are combined with high rubbing speeds comprising a major portion of mineral lubricating oil and a minor portion of the reaction product secured by reacting chlorinated petroleum naphtha with potassium ethyl xanthate, said reaction product containing sulfur in the form of xanthate and a residual amount of chlorine.

2. An extreme pressure lubricant comprising a mineral lubricating oil and in admixture therewith from one to twenty per cent of its weight of a product secured by chlorinating petroleum naphtha and then reacting it with potassium ethyl xanthate, said reaction product containing sulfur in the form of xanthate and a residual amount of chlorine.

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CERTIFICATE OF CORRECTION.

Patent No. 2,153,495. April 4, 1939.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 47, for "29-4" read 23-4; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of June, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.