

UNITED STATES PATENT OFFICE

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LUBRICANT

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2 Claims. (Cl. 252-37)

1

The present invention relates to lubricants, this application being a division of our application Serial No. 424,362, filed December 24, 1941, now Patent No. 2,346,357, April 11, 1944, and it has among its objects the provision of improved lubrication in high temperature, such as in internal combustion engines. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

The lubricant base may be a usual lubricating oil of viscosity desired in view of particular duty contemplated, or for instance 45 to 200 sec. S. U. at 210° F. We have found that salts of metals having oxidation activity or which are oxidation catalysts not particularly at crankcase temperature but at higher temperature promote diminution of carbonaceous deposits outstandingly, and in combination with what we term an "anti-oxidant" give results much better than the total of the respective agents alone, "anti-oxidant" here having a meaning not as with gasoline but as an inhibitor for metal catalysts such as iron, copper, or lead. It is particularly remarkable that an agent of oxidizing character and whose activity tends primarily to be antagonistic to anti-oxidant action should work to these ends. The salts of metals constituting the oxidation catalysts comprise: naphthenates; salts of acid radicals such as of tall oil or sulphurized tall oil; acids derived from the oxidation of petroleum fractions or polymers; xanthic, i. e. acids of the type



in which R is alkyl, aryl, alkaryl and sufficient to solubilize the metal compound; medium molecular weight fatty acids chosen so that the resulting salt will have 15-30 carbon atoms; acids derived from saponified wool fat (degras) with or without the alcohol, and the wool fat may be sulphurized e. g. with P₂S₅, before or after hydrolysis; and for conciseness such acids are hereinafter designated "organic acids of low volatility" the stated salts of which promote diminution of carbonaceous deposits. The naphthenates may also be chlorinated or halogenated, and in some cases sulphurized. The metals above referred to are chromium, also vanadium, manganese, cobalt and

2

molybdenum. In general, 1/2 to 2 per cent, or more, up to 3 per cent, of the metal compound may be used. The metal salts are used with the said anti-oxidant agents. These agents comprise sulphur-containing compounds such as P₂S₅ treated degreas, P₂S₅ treated poly olefins, P₂S₅ treated distilled cashew nut shell oil, etc. Up to 3 per cent, preferably 1/4 to 2 per cent of such agent additive to the metal compounds may be employed.

As an example: A lubricant is made up of S. A. E. 20 lubricating oil and 0.5 per cent of chromium naphthenate and 1.5 per cent of the reaction product of P₂S₅ on degreas.

As another example: A lubricant is made up with a similar oil and 0.5 per cent of chromium naphthenate and 2 per cent of the reaction product of P₂S₅ on polyolefin.

As illustrating the properties of such lubricants, the following test-results are noted in summary, in which F is bad or worse than the oil alone, i. e. over 30 mg. of lacquer and over 7 per cent of carbon residue, C is mediocre, i. e. 10-30 mg. of lacquer, and 3.0-7.0 per cent carbon residue, and A is excellent, i. e. less than 10 mg. of lacquer and less than 3.0 per cent of carbon residue.

	Oil+0.5% Cr Naph.	Oil+0.5% Cr Naph.+1.5% P ₂ S ₅ -degras	Oil+0.5% Cr Naph.+1.5% tetraphenyl diamino diphenyl methane
Carbon Residue at—			
525° F.-----	F	F	F
750° F.-----	A-	A-	C+
Detergency:			
Carbon suspension	C-	A	
Oxidation test-----	A-	A	C+
Oxidation Test:			
Deterioration-----	A-	A+	A
Corrosiveness-----	A-	A+	A

The carbon residue is determined by exposing a 2.5 g. sample of the lubricant in a 70 mm. diameter Petri glass dish in an electric furnace for 16 hours at 525° F., followed by 6 1/2 hours at 750° F. The carbon suspension is determined by suspending 5 1/2 per cent by volume of carbon in the lubricant, and a 100 cc. sample of the suspension in a 100 cc. graduate is set in an oven at 200° F., and the number of cc. of clear oil is measured at intervals. The oxidation and lacquer is determined by exposing the lubricant in the presence of metals, iron and copper, at a temperature of 310° F. for 65 hours by blowing air through at the rate of 30 liters per hour.

Other modes of applying the principle of the

invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

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

1. A lubricant promoting combustion of deposits in the combustion zone of internal combustion engines and producing high stability in the crank-case, which comprises a lubricating oil and one-fourth to three per cent of the reaction product of phosphorus sulphide on degreas and one-half to three per cent of chromium naphthenate.

2. A lubricant promoting combustion of deposits in the combustion zone of internal combustion engines and producing high stability in the crank-case, which comprises a lubricating oil and one-fourth to three per cent of the reaction product of phosphorus sulphide on degreas, and one-half to three per cent of a salt of a metal from

periodic group VI and those with atomic weight under 55 in the adjoining groups V and VII with an organic acid of low volatility the stated salts of which promote diminution of carbonaceous deposits.

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