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DIESEL ENGINE LUBRICANT

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3 Claims. (Cl. 252—33)

This invention relates to improvements in lubricating oils and, in particular, to lubricating oils adapted for service in internal combustion engines of the Diesel type.

Recent developments in internal combustion engines, and especially in Diesel engines in the direction of improved performance by increasing the speed and horsepower of the engines, has resulted in an increase in engine operating temperatures and pressures. In order to provide proper lubrication under prevailing severe operating conditions, additional requirements have been imposed upon the lubricants. For a lubricating oil to function properly under such conditions which now exist in the high speed internal combustion engines, it is imperative that they be resistant to oxidation and/or sludge formation at the high temperatures and pressures encountered.

One of the most serious troubles encountered in lubricating high speed combustion engines, in particular engines of the Diesel type, is ring sticking. Ring sticking is due to the decomposition or "break down" of the lubricants under the high temperatures and pressures to form sludge and other products of decomposition and/or oxidation which are deposited or formed in the piston ring grooves. Ring sticking causes excessive blowby resulting in decreased engine efficiency, excessive oil consumption, and engine wear. Oil ring sticking is most pronounced with paraffinic base oils, but it is known that naphthenic base oils have a tendency to cause clogging of the oil control rings. Paraffinic base oils, on the other hand, have the tendency to stick the top ring first. This is probably due to the thermal stability of the respective oils and the temperature gradient prevailing in the ring belt section of the piston.

It is, therefore, the primary object of this invention to provide a Diesel engine lubricant which will not have a tendency to deposit sludge and/or other carbonaceous materials in the ring grooves or on the piston clearance surfaces.

It is another object of the invention to provide a Diesel oil which will increase the life of rings and cylinders and give longer uninterrupted service.

It is a further object of the invention to provide a Diesel oil which will give improved cylinder sealing and consequent reduction in blowby of gases into the crank case.

It is still a further object of the invention to provide a material which, when added to Diesel lubricating oils, will give efficient lubrication and low oil consumption without the formation of deleterious products of decomposition.

We have discovered that the foregoing objects may be attained by adding to a Diesel lubricating oil a small amount, namely, from about 0.5% to about 5% and preferably 0.5% to 2%, of an organic aluminum sulfonate, preferably the oil-soluble aluminum sulfonates derived from the sulfonic acids obtained in the sulfuric acid treatment of lubricating oils. The preferentially oil-soluble aluminum petroleum sulfonates, or aluminum mahogany soaps as such products are known in the petroleum art, may be prepared by reacting the acid sludge resulting from the treatment of petroleum oils with concentrated sulfuric acid with aluminum sulfate in accordance with the method described in U. S. patent to R. E. Divine 1,438,101 of December 5, 1922, by the double decomposition of an aqueous solution of aluminum sulfate with sodium mahogany soap, or by any other suitable method.

The addition of the organic aluminum sulfonate materially improves the effectiveness of Diesel lubricating oils derived from any petroleum base oil or synthetic lubricating oils. However, we prefer to use a naphthenic base distillate lubricating oil having a viscosity in the range of a 20 S. A. E. to a 50 S. A. E. oil and a viscosity index of not over about 50 or 60. A distillate oil derived from a naphthenic base crude oil and having the following inspection is a specific example of the type of oil we prefer to use:

Gravity °A. P. I.		21.6
Viscosity at 100° F.	secs.	570
Viscosity at 210° F.	secs.	56.2
Viscosity index		24
Pour test °F.		—20
Ash	per cent	0.005
Carbon residue	do	0.08
Carbonization index		467
Indiana oxidation 10 mg.	hours	22
Indiana oxidation 100 mg.	do	48
Color N. P. A.		2½ to 3

The addition of 0.05% to about 5% and preferably 0.5% to 2% of an organic aluminum sulfonate to a Diesel lubricating oil of the above type results in an improved Diesel lubricant substantially stabilized against sludging and the formation of deleterious products of decomposition, and having improved cleansing properties which permit the flushing and washing away of materials which have a tendency to deposit in the ring grooves, permitting uninterrupted serv-

ice for long periods without the necessity of shutting down because of ring sticking.

Under some conditions aluminum mahogany soap may exhibit a detrimental effect on the color stability of the oil. We have found that the color stability of the oil containing aluminum mahogany soap may be materially improved by adding to the mixture very small amounts of an alkyl phosphite, such as tributyl phosphite or other color stabilizers such as the aliphatic polyamines, metallic alcoholates, etc.

The term "organic aluminum sulfonate" or "aluminum mahogany soap" as used herein and in the appended claims includes the chemically pure product and the commercially pure product which may contain, depending upon the method of preparation, smaller amounts of organic alkali sulfonates.

While we have described our invention by reference to a preferred embodiment thereof we do not wish to be limited to the specific examples which are merely set forth to illustrate our invention and not intended to be a limitation thereof, except insofar as defined in the appended claims.

We claim:

1. A non-ring sticking Diesel engine lubricating oil consisting of a mineral lubricating oil adapted for use in Diesel engines and 0.5% to about 5% of an organic aluminum sulfonate derived from the petroleum sulfonic acid resulting from the treatment of mineral oils with concentrated sulfuric acid.

2. A Diesel engine lubricating oil characterised by its anti-ring sticking properties consisting of a lubricating oil adapted for use in internal combustion engines of the Diesel type and 0.5% to 5% of an organic aluminum sulfonate derived from petroleum sulfonic acid.

3. A non-ring sticking Diesel engine lubricating oil consisting of a mineral distillate lubricating oil derived from a naphthenic base and having a viscosity index less than 50 and from about 0.5% to about 5% of an organic aluminum sulfonate derived from petroleum sulfonic acid.

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