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LUBRICANT

Clarence M. Loane and Bernard H. Shoemaker,
Hammond, Ind., assignors to Standard Oil
Company, Chicago, Ill., a corporation of In-
diana

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This invention relates to improved lubricants and particularly to improved lubricants adapted to reduce the wear of metallic surfaces with which the lubricant comes in contact.

Wear in internal combustion engines can be attributed to at least three causes, namely, abrasion, erosion and/or corrosion. Abrasion wear is due largely to foreign materials which find their way into the crank case of the engine through the intake system with the ventilating air. Erosion wear may be attributed to metal contact between the pistons or rings and the cylinder wall due to the rings or pistons breaking through the oil film. Wear of the latter type is encountered during the warming up period after a cold start at low temperatures. Under these conditions the piston warms up faster than the cylinder wall with the result that the piston becomes larger than the cylinder bore thus creating tremendous pressures during the time when the lubricant is apt to be most deficient at these parts. Corrosion wear is caused by oxidation or chemical action. Whereas, wear due to abrasion may be easily eliminated by using adequate air cleaners, wear due to erosion and/or corrosion is more difficult to overcome.

It is the primary object of the present invention to provide a lubricant which will more effectively reduce erosive and/or corrosive wear encountered in internal combustion engines. It is the further object of the present invention to provide a lubricant containing an addition agent which is effective in enhancing the wear reducing qualities of the lubricant to which it is added. Other objects and advantages of the invention will become apparent as the description thereof proceeds.

We have discovered that the wear of internal combustion engines can be materially reduced and even in some cases substantially inhibited by adding to a lubricant a small amount, namely, .01% to about 1% and preferably about .05% to .2% of an organic sulfone having the general formula



in which R and R' are the same or different hydrocarbon or substituted hydrocarbon groups, such as aliphatic—saturated or unsaturated—groups such as alkyl and alkylene groups, all-cyclic groups, aromatic groups, such as aryl groups, and/or substituted hydrocarbon groups

such as aralkyl and alkaryl radicals. Typical examples of the type of compounds which we may use are as follows:

Diamylsulfone	Octylsulfone
Dibutylsulfone	Diphenylsulfone
Dicyclohexylsulfone	Diphenylamylsulfone and
Diamylphenylsulfone	Naphthylsulfone
Dilaurylsulfone	

Our invention also contemplates the addition of compounds to lubricants which may upon oxidation form sulfones such as the sulfoxides. Thus we may add to the lubricant diamylsulfoxide, dicyclohexylsulfoxide, dilaurylsulfoxide and other sulfoxides of this type which upon oxidation may form a corresponding sulfone.

To determine the effectiveness of these compounds in reducing engine wear comparable tests were made on an engine lubricated with an ordinary lubricating oil and with the same oil to which had been added .10% of diamylsulfone. The tests were made on a standard six cylinder passenger engine connected to an Eddy current dynamometer, the engine being so arranged as to permit rapid and continuous recycling of a small quantity of oil throughout the lubricating system. The engine was operated at low temperature and at intermittent operation under which conditions there is a tendency to cause moisture condensation upon the cylinder wall, piston, and ring surfaces and consequently accelerate corrosion to these parts. The engine was run at 2000 R. P. M. and 10 brake horsepower output for one hour. The engine was then stopped and allowed to remain idle for three hours during which time cooling water was continuously passed through the system. After three hours of idling the operation was repeated. Under these conditions, the following results were obtained:

Oil:	Wear—Inches per 2500 miles
S. A. E. 20 oil (control)	0.0094
S. A. E. 20 oil + 0.10% diamyl sulfone	0.0067

The above data demonstrate the effectiveness of sulfones in reducing wear in internal combustion engines. In terms of "engine life" the above data indicate that an engine lubricated with an oil containing no anti-wear addition agent would have an engine life of about 15,000 to 20,000 miles whereas an engine lubricated with the same oil containing diamylsulfone would have an engine life of about 40,000 to about 50,000 miles.

The lubricants referred to herein may be liquids such as mineral lubricating oils or synthetic

lubricating oils or they may be greases. If desired, other addition agents may be added in conjunction with the sulfones, such as oxidation inhibitors, load carrying agents, sludge dispersing agents, pour point depressors and the like.

Having thus described our invention what we claim is:

1. A lubricant containing a small amount of an organic sulfone having the general formula



in which R and R' are radicals selected from the group consisting of aliphatic radicals, alicyclic radicals, aromatic radicals, and hydrocarbon substituted aliphatic, cycloaliphatic and aromatic radicals.

2. A lubricant characterized by its property to inhibit wear comprising a lubricant normally having the tendency to cause excessive wear, and an organic sulfone having the general formula



in which R and R' are radicals selected from the group consisting of alkyl, aralkyl, aryl, and alkaryl radicals said sulfone being added in small but sufficient quantities to inhibit wear.

3. A lubricant characterized by its property to inhibit wear comprising a lubricating oil normally having the tendency to cause excessive wear to metallic surfaces coming in contact therewith and an organic sulfone having the general formula



in which R and R' are alkyl radicals, said sulfone being added in small but sufficient quantities to inhibit wear.

4. A lubricant described in claim 3 in which the sulfone is diamylsulfone.

5. The method of reducing wear in an internal combustion engine which comprises lubricating said engine with a lubricant containing a small amount of an organic sulfone having the general formula



in which R and R' are radicals selected from the group consisting of aliphatic radicals, alicyclic radicals, aromatic radicals, and hydrocarbon substituted aliphatic, cycloaliphatic and aromatic radicals.

6. The method of reducing wear in an internal combustion engine which comprises lubricating said engine with a lubricant comprising a lubricant normally having the tendency to cause excessive wear, and an organic sulfone having the general formula



in which R and R' are radicals selected from the group consisting of alkyl, aralkyl, aryl, and alkaryl radicals said sulfone being added in small but sufficient quantities to inhibit wear.

7. The method of reducing wear in an internal combustion engine which comprises lubricating said engine with a lubricant comprising a lubricating oil normally having the tendency to cause excessive wear to metallic surfaces coming in contact therewith and an organic sulfone having the general formula



in which R and R' are alkyl radicals, said sulfone being added in small but sufficient quantities to inhibit wear.

8. The method of reducing wear in an internal combustion engine as described in claim 7 in which the sulfone is diamylsulfone.

CLARENCE M. LOANE.

BERNARD H. SHOEMAKER.