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LUBRICATING OIL CONTAINING DISPERSED MAGNESIUM

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1 Claim. (Cl. 252—26)

This invention relates to the improvement of lubricating oils of the type used in internal combustion engines.

As is well known, lubricating oils tend to oxidize under the conditions encountered in use in modern day diesel and automotive engines. The oxidation products formed in the oil are acidic in nature and exhibit a corrosive action upon the metal surfaces being lubricated. As is also well known, the oxidation of the lubricating oil is attended by formation of sludge, lacquer and resinous materials which are deposited on the engine parts, particularly in the piston ring grooves, so that the operating efficiency of the engine is lowered. To counteract these deleterious effects, it has been the practice of the lubricating art to fortify motor oils by the addition thereto of small amounts of chemical agents known as anti-oxidants which have the ability to inhibit the formation of acidic products in the oil. Chemical agents have also been developed which are capable of preventing the deposition of lacquer and sludge on the engine parts so that longer and more efficient operation of the engine is attained. As a rule, separate addition agents are required to provide anti-oxidant and detergent action in an oil. The present invention provides a novel addition agent for engine lubricating oils which improves the anti-oxidant as well as the detergent ability of such oils. It is, therefore, the object of this invention to provide motor oils containing this novel improving agent.

The aforesaid object is accomplished by the incorporation into the oil of a small amount of powdered magnesium.

Although it has been known heretofore to utilize a metal powder, for example zinc dust, as an anti-friction component in lubricants of the character used for the lubrication of certain types of machinery, such as friction gears, cutting tools, etc., as far as is known, it has never been suggested that magnesium powder would have utility as a lubricant addend, particularly for lubricating oils intended for use in internal combustion engines.

The magnesium metal may be dispersed in the oil by any suitable method, of which the following may be mentioned as illustrative: (*a*) a colloidal dispersion of the magnesium may be formed in the oil by arcing magnesium electrodes under the surface of the oil; (*b*) the magnesium, in the form of a liquid or vapor, may be injected into the oil to obtain a fine dispersion; or (*c*) the magnesium may be ground to the desired fineness by suitable means, such as by a ball mill and then stirred into the oil. To be suitable for the purpose of the invention, however, the particle size should not be greater than about 45 microns.

A unique method whereby a ready dispersion of the magnesium particles may be obtained in the oil at the point of use, i. e., in the crankcase of the engine, is that whereby the finely divided metal is mixed with molten wax, the mixture then being cooled and formed into pellets. These pellets may be added to the oil in the engine via the oil addition tube. This method is disclosed

and claimed in a copending application of Edward A. Oberright, Serial No. 360,349, filed June 8, 1953.

Although the dispersed magnesium particles tend to settle out of the oil after prolonged periods of storage, no disadvantage results as, in an engine, redispersion takes place immediately whenever the engine is started up. The use of a suitable dispersing agent, however, will provide a highly stable, long-lasting dispersion. Thus, ionic type dispersing agents, such as metal salts of alkyl phenols, phenolic acids, petroleum sulfonic acids, naphthenic acids, etc., are suitable for this purpose. Also, non-ionic type dispersants, such as Tween and Spans, lecithin, etc., may be used.

The ability of the dispersed magnesium as an anti-oxidant and detergent in engine lubricating oils is illustrated by the following example.

Magnesium metal, 40 to 60 mesh (Eimer and Amend), was ground with a mortar and pestle until it was in a very finely divided state and then passed through a 325-mesh screen to provide a particle size not greater than approximately 45 microns. A sufficient amount of the screened metal to give a 2 per cent concentration was then added to an S. A. E. 20 grade, solvent-refined motor oil having an S. U. V. of 55 seconds at 210° F.

Lauson engine test

The metal-oil dispersion thus prepared was subjected to the Lauson D–4 engine test. This test determines oil deterioration as primarily indicated by engine cleanliness and secondarily by corrosion of the copper-lead bearing. The engine is inspected for cleanliness of the rings, lands, ring grooves and piston skirt. Cleanliness ratings are made, based on a scale of from 100 to zero, a rating of 100 signifying a perfectly clean engine and a rating of zero representing the worst possible deposit condition. The copper-lead bearing of the engine is accurately weighed before and after the test run and the loss in weight thereof is recorded. The test involves the operation of the single cylinder, 4-cycle, liquid-cooled gasoline engine for 100 hours, the operating condition being as follows:

Oil temperature	°F.	270
Jacket temperature	°F.	212
Speed	R. P. M.	1825

One-half throttle
13.0–1 air-fuel ratio
Oil added every 20 hours

The fuel used in the test was a blended gasoline consisting of 40% thermal, 30% catalytically cracked and 30% straight run plus 2.5 cc. TEL/gal.

For purpose of comparison, a concurrent test was conducted on the base oil alone. The test on the base oil alone gave an engine cleanliness rating of 65 and showed a bearing weight loss of 557 milligrams per one-half bearing. The test on the blended oil, however, gave an engine cleanliness rating of 79 and showed a bearing weight loss of only 75 milligrams per one-half bearing.

The concentration of dispersed magnesium used in the oil generally will range from about 0.1 to about 5 weight per cent, depending upon the particular oil and the service conditions for which the oil is intended, the preferred amount being from about 1 to about 2 weight per cent.

Other additives, designed to improve the oil in various respects, such as pour depressants, viscosity index improvers, extreme pressure agents, etc., may also be used in the oil along with the magnesium.

Having now fully described the invention, what is claimed as new and patentable is:

A mineral lubricating oil composition, suitable for use in an internal combustion engine, having dispersed therein from about 0.1 per cent to about 5 per cent by weight

of magnesium particles of a size no larger than about 45 microns.

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