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LUBRICATING OIL

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Our invention relates to high quality lubricating oils and specifically comprises such products as new compositions of matter.

Present day mechanical devices require lubricating oils of high film strength. It has been found that the highest quality straight hydrocarbon lubricants have a film strength insufficient for efficient use in present day mechanical devices. With these high quality straight hydrocarbon lubricants when being used under conditions of high pressure, slow speeds and/or high temperatures, that the lubricant has a tendency to break down due to its low film strength under the above conditions. With high pressures on the rubbing surfaces the body of lubricant is squeezed out and there is only a thin film between the rubbing surfaces. It is readily seen that with a low film strength lubricant there would be a tendency for the lubricant to break down, decompose, and allow the rubbing surfaces to come into contact and cause seizure.

The object of our invention is to improve the film strength of hydrocarbon lubricants so they may be used with safety under conditions which would cause a breaking down of the straight lubricant. By practicing our invention the film strength of the lubricant may be economically improved.

In outline, our invention comprises the halogenation of high boiling hydrocarbons, waxes, and the like, then condensing or combining two or more of these halogenated molecules into one molecule. The product of this combination is added to hydrocarbon lubricants in varying quantities to improve the film strength, the exact quantity used depending on the quality and initial film strength of the original hydrocarbon lubricant.

To prove the efficiency of our invention we rupture the film of the lubricant under conditions simulating operating condition but with large scale laboratory equipment designed to keep operating conditions constant and to measure the pressure at which the lubricant breaks down. The equipment employed is known as the "Timken" testing machine and was developed by the Timken Roller Bearing Company and is known to the art. This appears to be the best equipment now available for making these tests. With several sets of identical rubbing surfaces it is possible to test lubricants under identical conditions and the relative film strength of each determined. These relative film strengths are converted in pounds per square inch on the rubbing surfaces for film rupture.

The following example of our invention is given to show one embodiment of our invention but it is to be understood that our invention is not limited thereto, except insofar as pointed out in our claims.

Hydrocarbon wax with a melting point of about 130° F. was chlorinated by direct chlorination and substitution to a melting point of about 60° F. The thus prepared chlorinated wax was freed of all excess chlorine and/or hydrogen chloride. To the resulting product sodium ethoxide in excess alcohol was added as a condensing agent. The excess alcohol was removed from the product and then the product thoroughly washed to remove any water soluble inorganic salts present. Small amounts of the original halogenated wax and of the condensation product were added to a hydrocarbon lubricant and tested on the Timken machine for film strength. The original hydrocarbon lubricant was also tested. The following results were obtained:

Oil	Timken machine pound weight	Pounds per square inch pressure for film rupture
Original hydrocarbon lubricant	18.2	10,500
Original lubricant plus 1% chlorinated wax	19.7	11,600
Original lubricant plus 1% of product of condensation of chlorinated wax with sodium ethoxide	23.0	13,500

By the addition of 1% of the product of condensation the pressure at which the lubricant broke down was raised from 10,500 pounds per square inch to 13,500 pounds per square inch. With poorer quality original lubricants larger quantities may be obtained to obtain the same improvement. If a lubricant with a film strength of higher than 13,500 pounds per square inch is required larger quantities of the condensation product should be used. As much at 5% or more of the product may be required.

The degree of halogenation may be varied over wide limits. In the above example the wax was halogenated to a 60° F. melting point. More or less halogenation may be employed. The degree of halogenation influences the amount of product to be used in the final lubricant.

Many methods of halogenation are known, any of which may be employed in this invention. It should be understood that this invention does not contemplate covering any halogenation process. Any of the halogens may be employed or a wax may be halogenated with two or more halogens,

or a blend of waxes halogenated with the various halogens.

Removing free halogens and/or halogen acids from the halogenated wax may be accomplished by any of the well known means, such as heating, heating under vacuum, or by the use of solvents, etc.

In the above example sodium ethoxide is used as the condensing agent. It will be readily seen that any of the alkali condensing agents may be employed such as inorganic alkalies, inorganic alkalies in organic solvents, condensing agents of the mixed organic-inorganic type such as sodamide, etc. The condensing reaction may be accomplished straight or in solution with various solvents, provided the solvent is removed before use.

We are not positive of the composition of the product of our invention. It, no doubt, is a mixture of a number of compounds, including unchanged halogenated wax, combined molecules resulting from the removal of two atoms of halogen from two molecules and the subsequent combination of the two molecules at the point the halogen was removed, molecules resulting from the addition of OC_2H_5 to the wax molecule by removing a halogen atom with the metallic atom of the condensing agent etc. The finished product contains halogen in organic combination. In the example given a small amount of halogen in organic combination was present in the finished product. Our invention is not to be limited on the above theory of chemistry which we think is involved in our invention, but rests on the unobvious and unexpected results obtained.

Any of the waxes either natural occurring or synthetic, or any of the high boiling hydrocarbons may be employed in our invention. By the term waxes, we include solid and liquid waxes from animal, vegetable, and petroleum origin.

The product of our invention may be efficiently added to any of the hydrocarbon lubricants of whatever classification including the high and low viscosity lubricants, blends of the two, greases, etc.

Having thus described our invention, what we claim is:

1. A lubricating oil of improved film strength comprising in combination a hydrocarbon oil and a small quantity of a condensation product obtained by condensing with an alkali condensing agent, a halogenated wax with a halogenated wax, said condensation product containing a small amount of halogen in organic combination.

2. A lubricating oil of improved film strength comprising in combination a hydrocarbon oil and a small quantity of a condensation product obtained by condensing with an alkali condensing agent a chlorinated wax with a chlorinated wax, said condensation product containing a small amount of chlorine in organic combination.

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