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LUBRICANT

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This invention relates to lubricants; and it comprises a new lubricant and rust remover particularly adapted for lubrication of, and for removing rust from, leaf springs, such as those of automobiles, railroad cars, etc., and also adapted for use on window sashes, elevators, conveyors, door hinges and other close fitting bearing surfaces having frictional contact; said lubricant comprising a light petroleum lubricating oil of the nature of a spindle oil containing dispersed graphite and also containing, and thinned by, a small amount of a volatile non-inflammable liquid adapted to reduce surface tension, said liquid containing one or more volatile chlorinated hydrocarbons and advantageously at least two thereof, said liquid also sometimes containing a small amount of a relatively volatile hydrocarbon oil, such as kerosene; all as more fully hereinafter set forth and as claimed.

The present application is a continuation in part of my copending application, Serial No. 338,639, filed February 8, 1929, and presents certain improvements over the invention of my prior Patent No. 1,462,799.

Numerous attempts have been made to produce compositions which, while giving adequate lubrication of leaf springs, will have sufficient penetrating power to reach all points between the leaves. Where such compositions carry graphite, as is often the case, the graphite also should reach these points; and the penetrating power should endure sufficiently long to allow this. Generally such compositions are made by simply diluting and thinning lubricating oil with gasoline. Aside from the fire hazard incident to these compositions in storage and handling, because of their low flash point, there are various other serious objections. The addition of gasoline considerably lessens the body or oiliness of the lubricating oil and if enough gasoline is present to insure penetration, after a time the proportion of lubricating oil between the bearing surfaces may, and often does, become inadequate. In compositions containing graphite, thinning with gasoline is not very efficient in promoting forward passage of the graphite and in any event there is always danger of premature evaporation of the thinner. These gasoline-thinned compositions are not suitable for use with electrical machinery or with surfaces under high load.

Better compositions are made by substituting kerosene admixed with some ether or other low boiling volatile solvent as set forth in my prior Patent No. 1,462,799.

The causes for the "penetrating" action of an oil are not well understood; by penetrating power being meant the ability of the oil to work its way between two closely contacted metal surfaces. "Penetration" and "oiliness" are closely related but not identical. Two important factors in this "penetration" are viscosity and surface tension. The penetrating power of an oil may be increased by reducing either of the two. In mixtures of lubricating oil and gasoline, the reduction is of the first of these factors, the viscosity, alone. The thinning agent being of the same general character, i. e. a hydrocarbon oil, as the lubricating oil, the resulting mixtures are molecularly homogeneous and the surface tension is merely the average of that of the ingredients.

In my prior acknowledged patent I produced molecularly non-homogeneous compositions by using various oxygenated organic bodies (ether, etc.) in admixture with mineral oil. There was a reduction of surface tension and penetration was better than corresponded to the sheer thinning of the lubricating oil. In the present invention, I proceed further in this direction by using as additions to the lubricating oil certain volatile and mobile liquid chlorinated hydrocarbons. These bodies give a considerable lowering in surface tension even with relatively small concentrations of the added ingredients; possibly because of molecular heterogeneity of the resulting solutions. Good penetration may therefore be secured with such mixtures without great reduction of the lubricating power and the mixtures carry graphite well. In use, when penetration is secured the small amount of added volatile material disappears, leaving lubricating oil in place.

Chlorinated hydrocarbons which I have

found advantageous are carbon tetrachlorid, chloroform, tetrachlorethane, trichlorethylene and dichlorethylene. It is advantageous to use mixtures of at least two of these bodies. The stated compounds are all liquid at 0° C. and boil below 200° C. and are therefore all suitable for the present purpose.

It is advantageous to use minor proportions of volatile hydrocarbon thinners with these chlorinated bodies; such thinners as kerosene, gasoline, benzol, toluol, etc., being suitable. A small amount of these liquids can be incorporated with advantage to the penetration and without adding substantial inflammability.

Into the composite lubricant produced as thus far described, I incorporate a certain amount of graphite or of another solid lubricant such as finely divided soapstone or talc. Mixtures may be used. The most suitable solid lubricant for my purposes however I believe to be air floated Ceylon graphite of such a grade that 100 per cent passes through a 170 mesh screen. Other graphites, natural or artificial may be used; but I have the best results with Ceylon graphite. The graphite has no great tendency to settle; indeed in my composition the graphite to the eye appears to be in a sort of seething motion; with an appearance which is sometimes described as a "silver fluorescence". This active motion on the part of the suspended graphite does not appear when the chlorinated hydrocarbon is omitted. It is my belief that the peculiar properties of the suspended graphite in this composition are in some way responsible for the marked rust removing properties of the present composition. After application of the present compositions to bearing surfaces and removal of the rust, microscopic examination of the bearing surface will disclose a closely adhering coating of fine particles of graphite. In the application of my composition to bearings in such a manner that there is an overflow of lubricant, it is noted that iron rust first appears in the overflow and then graphite.

Any light lubricating oil of the nature of spindle oil may be used in making my composition. Lubricating oils of either paraffin or asphaltic base with a viscosity of approximately 100° Saybolt at a temperature of 100° F. are advantageous.

To my composition it is generally desirable to add a small quantity of citronella, terpineol, etc. to give a pleasant odor.

The uses to which my composition may be put are very numerous. It has been found advantageous for lubricating leaf springs, window sashes, car seat slides, door hinges, elevators, conveyors, contact points, hand brakes, locking devices, crank apparatus, circuit breakers, electric switches, automatic control equipment, etc. It is also useful in cutting and removing gummy deposits, for removing rust bound nuts, bolts and flanges; for removing rust, for rust prevention, for the release of "frozen" bearings, etc.

Added to a heavy grease base, the composition is useful for lubricating any type of heavy duty bearings, transmissions, differentials, spur or worm gears, railroad journals, etc.

In compounding a penetrating lubricant under the present invention it is possible to vary the proportions of the various ingredients recited considerably. Much depends upon the particular use for which the composition is destined. In a specific embodiment of my invention making a composition with a flash test of 300° F. open cup, and 200° F. closed cup, (and therefore having no fire hazard) I add to a refined petroleum lubricating oil with a viscosity in the neighborhood of 100° Saybolt at 100° F., the various bodies mentioned in about the following proportions: 5 to 20 ounces of kerosene, 3 to 10 ounces of comminuted Ceylon graphite, 3 to 10 ounces of trichlorethylene, 3 to 10 ounces of carbon tetrachloride and a few drops of odorant; the amount of oil being sufficient to make a gallon.

The additions to the lubricating oil usually amount to less than 50 per cent of the final composition.

When it is desired to obtain a heavy lubricating grease of improved properties from 2 to 25 per cent of the above mixture may be added to one of the usual greases.

What I claim is:

1. A penetrating lubricant comprising lubricating oil having a viscosity of approximately 100° Saybolt at 100° F., suspended graphite and a small proportion of a thinner comprising one or more volatile, non-flammable chlorinated hydrocarbons.

2. A penetrating lubricant comprising lubricating oil, finely divided graphite and a small proportion of a thinner comprising at least one non-flammable chlorinated hydrocarbon selected from a group consisting of carbon tetrachlorid, chloroform, tetrachlorethane, trichlorethylene and dichlorethylene.

3. A penetrating lubricant comprising lubricating oil, suspended graphite and a small proportion of a thinner comprising one or more volatile, non-flammable chlorinated hydrocarbons, said thinner also comprising a small proportion of a thin hydrocarbon oil.

4. A penetrating lubricant comprising a mixture of lubricating oil and finely divided graphite with a small amount of a thinner, said thinner comprising a mixture of trichlorethylene and carbon tetrachlorid.

5. A penetrating lubricant comprising a mixture of lubricating oil and finely divided graphite with a small amount of a thinner, said thinner comprising trichlorethylene and carbon tetrachlorid and said thinner also comprising a small amount of kerosene.

6. A penetrating lubricant comprising a lubricating oil, air floated graphite and carbon tetrachlorid.

7. A penetrating lubricant comprising a lubricating oil, air floated graphite and trichlorethylene.

8. A penetrating lubricant comprising lubricating oil, a finely divided solid lubricant and a small proportion of a thinner comprising at least one volatile, non-flammable, chlorinated hydrocarbon.

9. A penetrating lubricant comprising lubricating oil, a finely divided, solid lubricant and carbon tetrachlorid.

In testimony whereof I have hereunto affixed my signature.

JAS. A. BURTON.