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LUBRICANTS

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10 Claims. (Cl. 252-42)

This invention relates to lubricants and more particularly to lubricants adaptable for low temperature lubrication.

Some types of machinery, such as the aeroplane, automobiles, trucks, ships and guns, must be lubricated when the machines are subjected to a wide range of temperatures. Such a temperature range may cover -50° F. to 200° F.

It is very desirable that the low temperature lubricant should have a comparatively uniform viscosity throughout the temperature range in which it operates. These lubricants should also be non-corrosive in the bearings and should be capable of carrying comparatively high bearing pressures.

The primary object of the present invention is to provide a lubricant capable of effectively lubricating bearings at low temperatures.

Another object of the invention is to provide a method of and lubricant for lubricating bearings which will be effective over a temperature range of from -40° F. to 200° F.

With these and other objects in view the invention consists in the improved lubricant and method of using it hereinafter described and particularly defined in the claims.

I have discovered that the oxalates, particularly the dialkyl oxalates, having comparatively high boiling points have good lubricating properties. For example, the diethyl, the dibutyl, the diisobutyl and the diisoamyl oxalates all boil above 370° F. and have very low melting points.

Some physical properties of the above-mentioned oxalates are:

	Boiling point, ° F.	Flash point, ° F.	Melting point, ° F.
Diethyl oxalate.....	371	168	-41
Dibutyl oxalate.....	470	265	
Diisobutyl oxalate.....	444	251	
Diisoamyl oxalate.....	511	241	

¹ Above.

The melting points of the dibutyl and diamyl oxalates have not been determined.

When the above-mentioned oxalates are tested in the 4-ball testing machine they have lubricating properties about 50% better than a mineral oil paraffin spindle oil having a viscosity of 200 @ 100° F. The addition of 3.2% of ethyl or butyl

oxalates to spindle oil will increase its load-carrying capacity about 33 1/3%. The viscosities of the diethyl and dibutyl oxalates are as follows:

	Temperature ° F.	Viscosities in centistokes
Diethyl oxalate.....	-40	14.2
	0	5.3
	100	1.37
	200	0.72
Dibutyl oxalate.....	-40	22.00
	0	11.4
	100	2.25
	200	1.05

By adding to the above-mentioned oxalates one of the well known extreme pressure addition agents, such as Polane, Santolube #261, and tricresyl phosphite, the load-carrying capacity of the oxalates may be increased at least 100%. For example, ethyl oxalate having a seizing point on the 4-ball testing machine of 450 lbs. will have a seizing point above 1000 lbs. with 1% of any of the above-mentioned addition agents. Dibutyl oxalate which has a seizing point on the 4-ball testing machine of 400 will not seize on the testing machine when having 1% of any of the above addition agents up to and above 1000 lbs.

The extreme pressure agent "Polane" mentioned above is chlormethyl stearate, while the "Santolube #261" agent is a sulfurized tin salt of an alkyl phenol carboxylic acid as clearly indicated by Patents Nos. 2,197,834-5, 2,256,441 and 2,257,751, under which it is manufactured. Other extreme pressure agents may be used, such as the sulfurized tricresyl phosphites disclosed in Engelke Patent No. 2,260,303.

A good low temperature grease can be made by incorporating a lithium soap such as lithium stearate in one of the dialkyl oxalates. Such a grease may consist essentially of a dialkyl oxalate such as dibutyl oxalate in which is incorporated approximately 6% of lithium stearate. A suitable grease may contain approximately 93% of dibutyl oxalate, approximately 6% of lithium stearate and approximately 1% of an extreme pressure agent.

The dialkyl oxalates of the present invention are neutral and non-corrosive to all of the bearing metals and alloys with which the product has been used. All of these oxalates are colorless

liquids and practically insoluble in water. These products are, however, miscible with fatty acid soaps and the extreme pressure additive agents.

The preferred form of the invention having been thus described what is claimed as new is:

1. A lubricant consisting essentially of a dialkyl oxalate having dissolved therein a small proportion of an extreme pressure agent sufficient to impart extreme pressure properties thereto.
2. A lubricant consisting essentially of a dialkyl oxalate having dissolved therein approximately 1% of an extreme pressure agent.
3. A lubricant consisting essentially of diethyl oxalate having dissolved therein a small proportion of an extreme pressure agent sufficient to impart extreme pressure properties to the lubricant.
4. A lubricant consisting essentially of a dibutyl oxalate having dissolved therein a small proportion of an extreme pressure agent sufficient to impart extreme pressure properties to the lubricant.
5. A lubricant comprising a major portion of a dialkyl oxalate having a small amount of a lithium soap embodied therein to provide a stable grease.
6. A lubricant comprising a major portion of dibutyl oxalate having a small amount of lithium stearate embodied therein to provide a stable grease.
7. A lubricant comprising a major portion of dibutyl oxalate having approximately 6% of lithium stearate embodied therein forming a stable grease.
8. A lubricant comprising dibutyl oxalate 93%, lithium stearate 6%, and an extreme pressure addition agent 1% forming a stable grease.
9. A lubricant consisting essentially of a diamyl oxalate having dissolved therein a small proportion of an extreme pressure agent sufficient to impart extreme pressure properties to the lubricant.
10. A lubricating grease comprising approximately 6% of lithium stearate, the remainder of the grease consisting essentially of a dialkyl oxalate.

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