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SULPHUR CUTTING OIL

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This invention relates to sulphurized lubricants, particularly sulphurized oils for use in the lubrication of cutting tools and the like.

Heretofore in the preparation of sulphurized oils, comprising sulphurized mineral oil, it has been considered necessary to sulphurize the mineral oil under high temperature and pressure in order to obtain sufficient sulphurization and a stable product. Such sulphurized oils, however, contain the sulphur in a more tightly combined form than is desirable and also the products tend to settle out sludge on storage.

Products have also been prepared heretofore by sulphurizing at lower temperatures mixtures of mineral oil and fatty oil. In such cases the sulphur has been taken up entirely by the fatty oil to produce relatively stable products in which the sulphur again is held in a relatively tightly bound form.

Furthermore it has been proposed heretofore to treat a lubricating oil having a high natural sulphur content of at least 0.75% whereby the oil may be sulphurized at a lower temperature and a stable product obtained. This method, however, limits the supply of the material since the amount of oils containing this high natural sulphur content is relatively small. Also such products contain an undesirable high sulphur content.

It has been found, according to the present invention, that improved products may be obtained by combining the sulphur directly with the lubricating oil at a relatively low temperature whereby normally an unstable product would be obtained and then stabilizing the product by the addition of a controlled proportion of fatty oil material. In this way a product containing loosely combined sulphur, which is advantageous in sulphurized cutting oils and the like and, at the same time, a stable product is obtained. Moreover the present invention is not restricted to any particular type of oil. Oils having an initial sulphur content of 0.4% or less may be used.

In the preparation of my improved product, a mineral lubricating oil or lubricating oil blend is sulphurized by heating with sulphur at a temperature of about 310–360° F. and preferably about 350° F. I have found that this temperature is critical and is essential for the preparation of my product. By incorporating the sulphur at a temperature within this working range, the sulphur is incorporated in the oil under optimum conditions whereby it exists in a loosely bound form and produces highly satisfactory results for the purposes herein contemplated. The lubricating oil is preferably one having a viscosity of about 100–180 seconds Saybolt Universal at 100° F. and preferably about 140–150 viscosity. Such an oil may be sulphurized directly or two oils, one of lower viscosity and the other of higher viscosity, may be separately sulphurized and then blended to obtain a sulphurized product of the desired viscosity. For example, an oil of about 100 viscosity may be sulphurized and another oil of 180 viscosity may likewise be sulphurized and then the two sulphurized products blended in proper proportions to give a blend having a viscosity within the preferred range. The amount of sulphur incorporated in the lubricating oil may be about 1–5% and preferably about 2–3%.

To the sulphurized mineral oil prepared as above described, and containing sulphur in a loosely bound form, is added a suitable fatty oil in sufficient amount to obtain a stable product. I may use for this purpose any good grade of animal or vegetable oil, such as lard oil, tallow oil, cottonseed oil and the like. Good results have been obtained using lard oil. While I may use straight fatty oil, it may be advantageous in some cases to use a sulphurized fatty oil. When sulphurized fatty oil is used the mineral oil and the fatty oil are sulphurized separately.

The sulphurized fatty oil is prepared by heating a good grade of commercial fatty oil, such as No. 1 lard oil, with about 5–15% sulphur and preferably about 10%, to temperatures of around 350–400° F. for sufficient time to obtain a homogeneous product. About 2–3% of the sulphurized fatty oil is incorporated in the above mentioned sulphurized mineral oil.

In order to further disclose the invention, the following example will now be given, it being understood that the example is merely for purposes of illustration and the invention is not restricted to this specific example.

	Per cent
Sulphurized 100 viscosity oil	47
Sulphurized 180 viscosity oil	40
Sulphurized lard oil	2½

The sulphurized 100 viscosity oil was prepared by heating 97% of the oil with 3% sulphur at about 350° F. for around 3 hours. The resulting product tested—

Gravity °A. P. I.	29.5
Viscosity S. U.@100° F.	109
Sulphur, per cent	3

The sulphurized 180 viscosity oil was prepared

by heating 97% oil was 3% sulphur at 350° F. for around 3 hours. This product tested—

Gravity °A. P. I.	24.5
Viscosity S. U.@100° F.	194
Sulphur.....per cent..	3

The sulphurized lard oil was prepared by heating 90% of No. 1 lard oil with 10% sulphur at about 400° F. for around 2½ hours. The resulting product tested 8% sulphur.

The sulphurized 100 viscosity oil, sulphurized 180 viscosity oil and sulphurized lard oil in the proportions specified in the above formula, were blended in a grease kettle to obtain a homogeneous product. The finished oil tested 2.4% sulphur and viscosity of 144 at 100° F.

The sulphur cutting oil prepared in accordance with the present invention has excellent cutting qualities and has been used extensively in commercial practice.

Obviously many modifications and variations of the invention as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A sulphur cutting oil consisting essentially of a mineral lubricating oil initially containing less than 0.4% sulphur sulphurized by heating with uncombined sulphur in the absence of added fatty oil under temperatures of about 310 to 360° F. and at substantially atmospheric pressure to produce a loosely combined sulphur content of 1 to 5% which would normally be unstable, and stabilized after sulphurization by the addition of 2 to 3% of a fatty oil.

2. A cutting oil consisting essentially of mineral lubricating oil initially containing less than 0.4% sulphur sulphurized by heating with uncombined sulphur in the absence of fatty oil at temperatures of about 310 to 360° F. and at substantially atmospheric pressure to produce a loosely combined sulphur content of 1 to 5% which would normally be unstable, and stabilized after sulphurization by the addition of 2 to 3% of a separately sulphurized fatty oil.

3. A product according to claim 2 in which the fatty oil is a lard oil.

4. A process for the manufacture of sulphurized mineral oils which comprises sulphurizing a mineral lubricating oil initially containing less than 0.4% sulphur by heating with uncombined sulphur in the absence of added fatty oil at temperatures of 310 to 360° F. and at substantially atmospheric pressure to produce a product having a loosely combined sulphur content of 1 to 5% which would normally be unstable, and then adding to the product about 2 to 3% of a fatty oil to stabilize the sulphurized product.

5. A process for the manufacture of sulphurized mineral oils which comprises sulphurizing a mineral lubricating oil initially containing less than 0.4% sulphur by heating with uncombined sulphur in the absence of added fatty oil at temperatures of 310 to 360° F. and at substantially atmospheric pressure to produce a product having an unstable loosely combined sulphur content of about 1 to 5% and then adding 2 to 3% of separately sulphurized fatty oil whereby the sulphurized product is stabilized.

6. The method in the manufacture of a sulphur cutting oil which comprises sulphurizing a mineral lubricating oil having a Saybolt viscosity of about 100–180 at 100° F. by heating with uncombined sulphur in the absence of added fatty oil at temperatures of about 310–360° F. and at substantially atmospheric pressure to produce a loosely combined sulphur content of about 2–3% which would normally be unstable, and then stabilizing the sulphurized oil by blending with about 2–3% of a fatty oil to produce a homogeneous product.

7. The method in the manufacture of a sulphur cutting oil which comprises sulphurizing a mineral lubricating oil having a Saybolt viscosity of about 100–180 at 100° F. by heating with uncombined sulphur in the absence of an added fatty oil at a temperature of about 350° F. and at substantially atmospheric pressure to produce a loosely combined sulphur content of about 2–3% which would normally be unstable, and then stabilizing the sulphurized oil by blending with about 2–3% of a separately sulphurized lard oil to produce a homogeneous product.

8. A sulphur cutting oil consisting essentially of a mineral lubricating oil having a Saybolt viscosity of about 100–180 at 100° F. sulphurized by heating with uncombined sulphur in the absence of added fatty oil at a temperature of about 350° F. to produce a loosely combined sulphur content of about 2–3% which would normally be unstable, and stabilized after sulphurization by the addition of about 2–3% of a separately sulphurized lard oil.

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