

[54] DRAWING OIL	3,702,301	11/1972	Baldwin	252/56 R
[75] Inventor: Klaus-Jurgen Flis, Bochum, Germany	3,785,978	1/1974	Uhlich.....	252/56 R
	3,799,875	3/1974	Rohde.....	252/58

[73] Assignee: **Deutsche Texaco Aktiengesellschaft, Hamburg, Germany**

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Primary Examiner—Delbert E. Gantz
Assistant Examiner—I. Vaughn
Attorney, Agent, or Firm—T. H. Whaley; C. G. Ries;
 James J. O'Loughlin

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[58] **Field of Search** 252/56 R, 58, 392; 72/42

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

Lubricating oil composition comprising from about 60 to 90 percent of a mineral oil, from about 5 to 30 percent of a vegetable oil or a fatty acid and from about 3 to 15 percent of a chlorinated paraffin containing greater than 40 percent chlorine.

7 Claims, No Drawings

DRAWING OIL

BACKGROUND OF THE INVENTION

Drawing oils are lubricants employed for forming metal by bending or shaping the metal under pressure without any cutting taking place. Drawing oils are conventionally employed in metal processing techniques or operations such as forging, rolling and drawing. Typical items manufactured using the foregoing forming techniques are parts for the doors of passenger cars, door transoms, transmission tunnels and housings or the fuel tanks of motor vehicles. The noted processing techniques geometrically reshape or bend the material in question and actually cause the metal to flow under the pressure employed in some of the shaping steps. The thickness of the material being processed is frequently reduced causing substantial friction between the material being processed and the die employed in the operation.

An important function of the drawing oil is that it act as a lubricant between the metal being shaped and the die to which the material is being conformed. Another important property of the drawing oil is that it enhance or improve the surface of the finished product or leave it in a condition which facilitates further treatment without causing new problems in the manufacture of the desired product. The drawing fluid should give good protection to the metal being worked against rust and should be easily removed in an alkaline and/or solvent washing bath.

Drawing oils are used for the shaping of various metals such as carbon steels, low-alloy steels and stainless steels as well as for the forming of non-ferrous metals including copper, aluminum, zinc and nickel.

DESCRIPTION OF THE PRIOR ART

Soap solutions, emulsions, pure mineral oil, mineral oil with a small amount of a non-corrosive extreme pressure additive or fatty oil have been employed in metal stamping and light bending operations.

Pure fatty oils, mineral oils with a large amount of an extreme pressure additive, chlorinated oils, sulfurated oils and drawing greases have been employed in deep-drawing and heavy bending metal operations.

SUMMARY OF THE INVENTION

In its broadest aspects, the lubricant of the invention comprises a major portion of a mineral oil of suitable viscosity, from about 5 to 30 weight percent of an additive from the class consisting of vegetable oils and fatty acids and from about 3 to 15 weight percent of a chlorinated paraffin containing greater than 40 percent chlorine.

More specifically, the lubricating oil composition of the invention comprises from about 60 to 90 weight percent of a mineral oil having a viscosity in centistokes at 50°C. from about 250 to 600, from about 5 to 30 weight percent of an additive from the class consisting of vegetable oils and a fatty acid having from about 10 to 35 carbon atoms and from about 3 to 15 weight percent of a chlorinated paraffin containing greater than 40 up to about 80 percent of chlorine.

The mineral oil component of the lubricant of the invention is obtained from a liquid top residue or a residual oil. This fraction is refined or distilled to remove any asphalt or waxy paraffins to yield a high viscosity oil commonly referred to as a bright stock.

Crude oils of certain origins may be directly refined or distilled to yield a bright stock or a cylinder oil which is suitable as a base oil for the lubricant of the invention. The base mineral oil of the invention is characterized by having a viscosity at 50°C. in the range from about 250 to 600 centistokes and at 100°C. from about 20 to 70 centistokes. The preferred base oil has a viscosity at 50°C. from about 250 to 350 centistokes and at 100°C. from about 20 to 45 centistokes. The density of the base oil is from 0.90 to 0.960 grams per ml. at 15°C. and the open cup flash point is at least 330° C.

The base oil comprises from 60 to 90 weight percent of the lubricant of the invention with the preferred concentration of the base oil being from about 70 to 75 weight percent.

The second essential component of the lubricant of the invention is selected from the class consisting of vegetable oils and fatty acids. Examples of suitable vegetable oils include rapeseed oil, palm nut oil, linseed oil, coconut oil, hempseed oil and sunflower seed oil. Rapeseed oil, coconut oil and palm nut oil are the preferred vegetable oils for formulating the lubricant of the invention.

The fatty acid additive which can be employed encompasses the fatty acids which are obtained by known methods from vegetable oils and include mixtures of fatty acids such as is obtained in the fat splitting of vegetable oils. These mixtures are often suitable for direct use in the lubricant of the invention without further refining. In general, the fatty acids which are suitable contain from 10 to 35 carbon atoms with a preferred members being those containing from 10 to 25 carbon atoms. It will be understood that the fatty acid can be a synthetic fatty acid or synthetic fatty acid mixture obtained synthetically rather than from natural sources. Examples of suitable and preferred fatty acids include stearic acid, palmitic acid, myristic acid, linolenic acid, linoleic acid, oleic acid and erucic acid.

Another essential component of the lubricant of the invention is a halogenated hydrocarbon or, more particularly, a chlorinated paraffin. This additive consists of a paraffin base in which the paraffin has from 6 to 12 carbon atoms which has been chlorinated until the finished chlorinated paraffin contains greater than 40 percent and up to 80 percent chlorine. The concentration of the chlorine in the chlorinated paraffin is critical since the lubricant of the invention is not effective for the purposes intended when the chlorinated paraffin component contains less than 40 percent chlorine. A highly effective chlorinated paraffin which is commercially available contains about 54 percent chlorine and has a viscosity of about 8,000 centipoises at 20°C.

The chlorinated paraffin component of the lubricant of the invention is employed at a concentration from about 3 to about 15 weight percent of the lubricating oil composition. A preferred concentration of this component is from about 5 to 10 weight percent.

The following examples illustrate the preparation of a lubricant composition according to this invention.

EXAMPLE I

In a heatable laboratory vessel fitted with a stirrer, the following items were mixed with constant stirring (about 20 rpm) at 50°C, the total weight of the mixture at the start being 50 kg; 75 weight by weight of a dewaxed, deasphalted, refined and high-viscosity bright stock having a specific gravity at 15°C. of 0.912, a flash point (COC) of at least 282°C, a pour point of -15°C

and a viscosity at 50°C of 325 cSt; 5 percent by weight of a chlorinated paraffin (TM 8051/1 made by Hoechst) which had a chlorine content of about 54 percent a viscosity of about 8000 cP at 20°C, about 0.5 percent phosphorus content and a rust inhibitor; 20 percent by weight 'olein'. The analysis data for this formulation are listed in Table I below:

EXAMPLE II

The following ingredients were mixed together and stirred at 50°C; 70 percent by weight of a high-viscosity cylinder oil obtained by processing a paraffin-based crude oil, the cylinder oil having a density of 0.945 g/ml at 15°C, a flash point (COC) of at least 275°C, a pour point of -4°C and a viscosity of 332 at 50°C; 20 percent by weight rapeseed oil (density 0.91, saponification number 167-174, iodine number 97-100); 10 percent by weight of the chlorinated paraffin described in Example 1. The analysis data for this formulation are repeated in Table I.

EXAMPLE III

The components described in the previous Examples were mixed in the following proportions; 70 percent by weight bright stock, 20 percent by weight olein, and 10 percent by weight chlorinated paraffin. The properties of the formulation are also given in Table I.

TABLE I

Analysis data of the drawing oil formulations			
	Ex. 1	Ex. 2	Ex. 3
Density at 15°C.g/ml	0.928	0.958	0.935
Flash Point (COC), °C.	246	210	218
Pour Point, °C.	-13	-8	-13
Viscosity at 50°C,cSt	140	130	105
Viscosity index	93	40	93
JAN-KAMMER test*	no rust after 200 Hrs.	no rust after 200 Hrs.	no rust
VKA test, kp** (ok load/welding load)	220/240	240/260	260/280
Neutralization number	40	40	40

*test for corrosion inhibition

**four-ball test

The high performance drawing oils produced in the Examples were tested in the deep-drawing of motor vehicle or car body parts and other metal objects (e.g. wheelbarrow boxes).

DRAWING OIL OF EXAMPLE 1

The material (St 14,05)* to be drawn was in the form of a sheet 1.25 mm thick × 1270 mm × 950 mm. In comparison to normal drawing oils such as low viscosity mineral oils + boric acid, mineral oil + graphite or soap + boric acid, the same quantity of the new drawing oil could process from the same number to one and a half times the number of parts. The results showed

- better rust protection for parts stored inside,
- parts more easily washed and cleaned either in alkaline baths or with organic or inorganic solvents,

- no formation of deposits after the washing nor after possible process annealing of the parts with an open flame, and
- simple, easy application (roll, brush, paint, spray, immersion).

*These numbers and similar ones below indicate a particular quality of sheet steel for motor vehicle body parts, standardized according to the German Industrial Standard (DIN).

DRAWING OIL OF EXAMPLE 2

- In comparison with the normal drawing oils listed above, twice the number of motor vehicle body parts (material: RR 14,03, dimensions 1 mm thick, × 1300 mm × 760 mm) could be deep-drawn without waste or spoilage. The same advantageous qualities as described above were also obtained with this drawing oil.

DRAWING OIL OF EXAMPLE 3

- Motor vehicle body parts (materials: St 12,03, St 13,03, St 14,05, RR 14,03 with thicknesses ranging from 0.8 mm to 1.25 mm) were submitted to deep-drawing and three times the number of parts could be processed without waste or spoilage and with only minimum wear and tear on the implements employed. The qualities ascribed to the use of the drawing oil of Example 1 were also attained here.

Practical use showed the formulation used in Example 3 to be the best. The reasons for this are its better ageing characteristics, the film strength and lubricity of the bright stock and the higher content of chlorinated paraffin.

I claim:

1. A lubricating oil composition comprising from about 60 to 90 weight percent of a mineral oil having a viscosity of 50°C. in the range of about 250 to 600 centistokes, from about 5 to 30 weight percent of an additive from the class consisting of vegetable oils and from about 3 to 15 weight percent of a chlorinated paraffin containing greater than 40 up to 80 percent chlorine.

2. A lubricating oil composition according to claim 1 in which said vegetable oil is selected from the group consisting of rapeseed oil, palm nut oil, linseed oil, coconut oil, hempseed oil and sunflower seed oil.

3. A lubricating oil composition according to claim 1 in which the paraffin portion of said chlorinated paraffin is derived from a paraffin having from 6 to 12 carbon atoms.

4. A lubricating oil composition according to claim 1 in which said chlorinated paraffin contains about 54 weight percent chlorine.

5. A lubricating oil composition according to claim 1 in which said vegetable oil is rapeseed oil in a concentration of about 20 weight percent and said chlorinated paraffin contains about 54 percent chlorine and is employed at a concentration of about 10 weight percent.

6. A lubricating oil composition according to claim 1 in which said mineral oil base has the density from about 0.90 to 0.96 grams per ml. at 15°C. and an open cup flash point of at least 330°C.

7. A lubricating oil composition according to claim 1 in which said vegetable oil is olein.

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