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[54] LUBRICATING COMPOSITION

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[58] **Field of Search** 252/59, 16; 106/230, 272

[56] **References Cited**

UNITED STATES PATENTS

2,785,111 3/1957 Vierk et al. ..... 252/59 X

OTHER PUBLICATIONS

Gedecke et al. " Chemical Abstracts" Vol. 55 (1961) Cols. 27,873 & 27,874.

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[57] **ABSTRACT**

A protective lubricant composition suitable for use as a wire rope lubricant, comprising about 75 to 95 weight percent of an asphalt, about 4 to 20 weight percent of a high viscosity index, distillate mineral lubricating oil and about 0.5 to 15 weight percent of Fischer-Tropsch wax.

5 Claims, No Drawings

LUBRICATING COMPOSITION

This invention relates to protective lubricant composition, especially suitable for applications to wire ropes, metallic strands and other metallic articles. Wire ropes, i.e., cables, are used for many types of materials handling work. They are used for light and heavy, short and long hauling, pulling and dragging, often under extreme temperature conditions found in machines, storerooms, or desert and arctic climates. The ropes also are exposed to water, dirt, chemicals and other corrosive contaminants. Because wire ropes and other comparable metallic articles are subjected to such uses and conditions they must be protected by lubricants which can withstand great pressures, protect against corrosion, and not melt and drip or become soft and tacky at high temperatures or not tend to chip or crack in cold temperatures.

It is known that lubricants for metallic articles such as wire ropes can provide this protection if the lubricants have good lubricating properties and relatively high softening points and penetration values but low viscosities at elevated temperatures. Protective lubricants require high softening points to prevent the lubricants from becoming too soft or sticky for use at ambient or elevated temperatures or from melting or running when used under extremely hot conditions. High penetration values insure that the lubricants will not become brittle and tend to chip or break in very cold temperatures. Protective lubricants are normally applied to wire ropes at elevated temperatures and it is important that the lubricants have relatively low viscosities under such conditions so that the compositions can be easily handled as by pumping and will provide an even, full and continuous coating of the wire rope.

Manufacturers of wire ropes have found that protective lubricants having test specifications in certain ranges have the desired properties. One such manufacturer's specifications are listed in the table below.

TABLE I

	Allowable Ranges of specifications
Penetration at 77° F., ASTM-D5	110–130
Softening point (ring and ball),° F.	135–145
Furol viscosity at 250° F., sec.	130–160
Salt spray corrosion, 100 hrs. at 110° F.	no rust
Mean Hertz (EP) load, Kg	35 min.
Four ball wear, scar diam, mm (600 RPM, 40 Kg, 168° F.)	0.60 max.

It has been difficult to manufacture protective lubricants having specifications in the ranges shown in Table I. In the efforts to make such lubricants, it is common, for example, to add oils to asphalt stocks to lower the softening points of the asphalt stocks, increase their penetration values and lower their viscosities. Asphalt-oil blends, however, have not heretofore been sufficient to meet all of the specifications required of wire rope lubricants nor have suitable compositions been provided by the addition of certain other components to the asphalt-oil blends.

It has now been found that the provision of a minor amount of Fischer-Tropsch wax to certain asphalt-oil blends significantly increases the softening points of the asphalt-oil composition, lowers its penetration value and lowers its viscosity at elevated temperatures sufficiently to provide a good protective lubricant and even meet the above listed specifications for wire rope lubricants.

The lubricants of this invention are blends of about 75 to 95 weight percent of mineral oil asphalt residium having a penetration at 77° F. (ASTM–D5) of about 20 to 150 and a Ring and Ball softening point of about 105° to 150° F.; about 4 to 20 weight percent of a mineral lubricating oil distillate having an SSU viscosity at 100° F. of about 125 to 175 and a viscosity index of at least about 90; and about 0.5 to 15 weight percent of a Fischer-Tropsch wax having a congealing point (ASTM–D938–49) of from about 202° to 207° F., and a 100 gram penetration value at 77° F., sec(mm/10) (ASTM–D1321–T) of about 2 maximum. Preferably, these amounts are about 80 to 92 weight percent asphalt, about 5 to 15 weight percent lubricating oil and about 1 to 10 weight percent Fischer-Tropsch wax.

The asphalt component which is blended with a lubricating oil and a Fischer-Tropsch wax to form the compositions of this invention can be a petroleum residium. Preferably, the asphalt is obtained as a precipitate by solvent deasphalting a reduced mineral crude oil, e.g. a Mid-Continent reduced crude oil. The solvent in such operations is often a lower alkane of three to five carbon atoms, e.g. propane or pentane. The asphalt component preferably has a penetration at 77° F. (ASTM—D5) of about 30 to 50 and a Ring and Ball softening point of about 125 to 135. A quite suitable asphalt has a penetration at 77° F. of about 41 and a softening point of about 129° F.

The lubricating oil employed as a component in the protective lubricant composition of this invention is a distillate fraction of a mineral oil, and the distillate preferably has a viscosity at 100° F. of about 140 to 160 SUS and a viscosity index of at least about 93. It has been found advantageous to employ a lubricating oil having a viscosity at 100° F. of about 150 SSU and a viscosity index of about 95. To obtain lubricating oil fractions having the desired properties the oil, for instance derived from a mixed base crude, can be subjected to conventional lubricating oil refining processes to remove most of the aromatic constituents and paraffinic waxes. Preferably the distillate is refined by hydrofinishing, dewaxing and aromatics removal, the latter by treatment with a solvent selective for aromatics such as phenol.

The wax employed in the compositions of this invention is obtained by the Fischer-Tropsch process which essentially comprises synthesizing carbon monoxide and hydrogen in the presence of a catalyst such as iron or cobalt to form gasolines, diesel fuels and waxes. The inclusion of small percentages of the wax renders an otherwise incapable asphalt-lubricating oil composition, capable of meeting the specifications of a good protective lubricant such as those required of a wire rope lubricant.

The protective lubricant composition of this invention is advantageous in that it does not require the inclusion of conventional additives as preventive agents against rust and corrosion. Such preventive agents can, however, be incorporated into the compositions of this invention so long as there is no deleterious result.

The significance of including wax in the asphalt-lubricating oil blend can be seen from the comparative data of the table below:

TABLE II

Blend	A	B	C	D	E	F	G	Wire rope specifications
Composition, wt. percent:								
Asphalt	86.50	91.50	84.77	89.47	83.04	87.84	86.00	----------
Lubricating oil	13.50	8.50	13.23	8.33	12.96	8.16	10.50	----------
Fisher Tropsch wax			2.00	2.00	4.00	4.00	3.5	----------
Tests:								
Penetration, 77° F. (DS)	280.0	186.0	178.0	119.0	147.0	83.0	117	110–130
Softening point (R&B), ° F.	95.0	103.0	110.5	117.5	150.0	157.0	140	135–145
Furol viscosity, 250° F. sec.	168.7	212.4	145.0	184.6	122.3	147.7	144	130–160
Salt spray corrosion, 100 hrs. 110° F.							(1)	(1)
Mean hertz (EP) load, kg.							[2] 44	[2] 35
Four ball wear, scar dia. mm. (600 rpm, 40 kg. 168° F.)							[3] 37	[3] 60

[1] No rust. [2] Minimum. [3] Maximum.

The asphalt component used to obtain the data of Table II had a penetration value at 77° F. of about 41, a Ring and Ball softening point of about 129 and was a propane-precipitated asphalt obtained from a reduced Mid-Continent crude oil. The lubricating oil was a hydrofinished, dewaxed, phenol extracted distillate from a mixed base crude oil. The refined oil had a viscosity at 100° F. of about 150 SSU and a viscosity index of about 95. The Fischer-Tropsch wax had a congealing point of about 205° F. (ASTM–D938–49), and a 100 gram penetration value at 100° F. of below 2 (ASTM–D1321–61T).

A comparison of the data of Table II confirms that blends of asphalt and lubricating oil alone (Blends A and B) will not enable one to meet the indicated allowable wire rope lubricant specifications because when the weight percent of the oil is increased, the penetration value of the blend becomes excessively high, whereas the addition of a minor amount of the Fischer-Tropsch wax enables one to increase the oil content of the compositions to lower its viscosity but without producing excessive increases in penetration. The factors even permit the indicated wire rope specifications to be met by the presence of about 3.5 weight percent of the Fischer-Tropsch wax in Blend G.

It is significant that a Fischer-Tropsch wax component having the hereinbefore designated properties can be used with the asphalt-oil blend to make the compositions of this invention for it has been found that substituting, for example, polyethylene for the wax does not produce a suitable protective lubricant for wire ropes. It has been found that when a straight chain polyethylene such as Epolene N–10 which has a penetration at 77° F. of 1.5 and a Ring and Ball softening point of 232° F., is blended with the same asphalt and oil whose properties have hereinbefore been enumerated, incompatible mixtures were obtained when the amount of polyethylene employed approached that needed to meet required specifications. When an oxidized polyethylene called Epolene E–10 having a penetration at 77° F. of 2 and a Ring and Ball softening point of 216° F., was blended with the asphalt and oil, compatible mixtures were obtained when up to 20 weight percent of Epolene E–10 was added, but the blends failed to meet the specifications since the additions caused an increase, rather than a decrease, in viscosity of the asphalt oil blend.

I claim:

1. A protective lubricant composition comprising about 75 to 95 weight percent of asphalt residium having a penetration at 77° F. (ASTM—D5) of about 20 to 150 and a Ring and Ball softening point of about 105° to 150° F.; about 4 to 20 weight percent of a distillate mineral lubricating oil having a viscosity at 100° F. of about 125 to 175 SSU and a viscosity index of at least about 90; and about 0.5 to 15 weight percent of Fischer-Tropsch wax having a congealing point (ASTM–D938–49) of from about 202° to 207° F. and a 100 gram maximum penetration value at 77° F., sec(mm/10) (ASTM–D1321–61T) of about 2.

2. The composition of claim **1** comprising about 80 to 92 weight percent of asphalt residium having a penetration at 77° F. (ASTM–D5) of about 41 and a Ring and Ball softening point of about 129° F.; about 5 to 15 weight percent of a mineral lubricating oil distillate having a viscosity at 100° F. of about 140 to 160 SSU and a viscosity index of about 95; and about 1 to 10 weight percent of a Fischer-Tropsch wax having a congealing point (ASTM–D938–49) of from about 202 to 207° F. and a 100 gram maximum penetration value at 77° F., sec(mm/10) (ASTM–D1321–61T) of about 2.

3. The composition of claim **2** wherein the asphalt residium is precipitated from reduced Mid-Continent crude oil by a C_3 to C_5 alkane solvent.

4. The composition of claim **3** wherein said distillate lubricating oil is a hydrofinished, dewaxed, phenol extracted distillate of a mixed base crude oil.

5. The composition of claim **4** wherein there is present about 86 weight percent of said asphalt, about 10.5 weight percent of said distillate lubricating oil and about 3.5 weight percent of said Fischer-Tropsch wax composition.

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