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STAINLESS EMULSIBLE GREASE

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3 Claims. (Cl. 252—21)

1

The present invention is directed to a stain-
less, emulsi?e grease composition which may be
employed in pipe bending and wire drawing
operations and the like.

The stainless, emulsi?e grease composition of
the present invention comprises a composition
having as major ingredients an alkaline base oil
containing alkali metal petroleum sulfonates and a
hydrocarbon in the lubricating oil boiling range
having a viscosity of approximately 75 to 500 SSU
at 100°F. The alkaline base oil may be prepared
preferably by exhaustively sulfonating with con-
centrated sulfuric acid a solvent extract of a lubri-
cating oil fraction obtained from a naphthenic base
crude, such as a lubricating oil fraction from a
coastal crude. For example, a phenol extract of a
lubricating oil fraction from a coastal crude having
a viscosity of approximately 75 SSU at 100°F
may be exhaus-
tively treated with concentrated sulfuric
acid, the sludge separated and the acid oil
neutralized with caustic alkali, such as sodium
hydroxide and the neutralized oil, which may con-
tain an excess of caustic alkali, exhausted by
blowing with air to remove moisture. The finished
base oil contains from 10% to 15% by weight of
alkali metal petroleum sulfonates in addition to
some excess caustic alkali with the remainder
being unsulfonated oil.

The hydrocarbon oil and sulfonates which may
contain a suficient amount of caustic alkali to
make the mixture alkaline may be prepared by
admixing petroleum sulfonates, a hydrocarbon
in the lubricating oil boiling range having the
viscosity mentioned before and a small amount
of a caustic alkali. The hydrocarbon oil ordi-

narily boils in the lubricating oil boiling range
and should have a viscosity of 75 to 500 SSU
at 100°F and should be relatively free of aroma-

tic hydrocarbons. The alkaline base oil pro-
duced, as mentioned before by exhaustively sul-
fonating a phenol extract of a naphthenic lubri-
cating oil fraction, may contain alkali metal
petroleum sulfonates having molecular weights
in the range from about 225 to 400. The alkaline
base oil may be employed in the composition of
the present invention in an amount in the range
from 25% to 75% by weight with a preferred
concentration in the range between 50% to 60%
by weight. The petroleum sulfonates consist of

about 10% to 15% by weight of the alkaline
base oil.

A composition in accordance with the present
invention may contain the ingredients thereof in
the proportions set out in the following table:

Table I

<table>
<thead>
<tr>
<th></th>
<th>Weight Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Base Oil</td>
<td>25—75</td>
</tr>
<tr>
<td>Petroleum Sulfonate</td>
<td>2.5—11.5</td>
</tr>
<tr>
<td>Oil</td>
<td>3.5—20.5</td>
</tr>
<tr>
<td>Polyhydroxy Alcohol</td>
<td>1.5—9.5</td>
</tr>
<tr>
<td>Cycliclohexyamine</td>
<td>0.5—6.2</td>
</tr>
<tr>
<td>Fatty Acid</td>
<td>1.2—2.3</td>
</tr>
<tr>
<td>Toluene Ratio to Base Oil</td>
<td></td>
</tr>
</tbody>
</table>

The tall oil which is employed in my improved
grease serves to impart adhesive powers to the
mixture and may be employed in the grease
composition in an amount in the range from about
0.5% to about 2% by weight, although it is pref-
erably employed in an amount in the range from
0.5% to 0.8% by weight.

The polyhydroxy alcohol which imparts water
emulsibility to the composition may be employed
in an amount in the range from 0.5% to 2.0% by
weight and preferably is employed in an amount
in the range between 0.5% to 0.6% by
weight. As examples of the polyhydroxy alcohol
may be mentioned glycerol, propylene glycol,
diethylene glycol, triethylene glycol, and the
like. Other polyhydroxy alcohols may be used
provided they are water soluble and miscible with
the composition.

The corrosion inhibitor is preferably cyclo-

hexyamine and should be present in a concen-
tration of at least 0.3% by weight. The amount
of corrosion inhibitor will depend on the par-
cular corrosion inhibitor employed but ordi-
narily will not exceed 1% by weight of the com-
poosition but preferably will be in an amount in
the range of 0.4% and 0.5% by weight of the
composition. As a general statement, it may be
said that the corrosion inhibitor may be oil
soluble. Examples of the oil soluble corrosion
inhibitors are: phenylalphanaphthylamine, di-
cyclohexylamine, isocyclohexylmethylamine, and
the like.

The fatty acid is employed in the composition
of the present invention to improve the lubri-
cating properties of the mixture. The fatty acid
may also react with some of the excess alkali in
the alkaline base oil and form, for example when
stearic acid is employed, the stearate which im-
proves the lubricating properties of the mixture
and imparts increased bearing strength and acts
as a soap or emulsifying agent to allow the im-
proved grease to be removed by washing the sur-
face, to which it is applied, with water. Ordin-
arily the concentration of the fatty acid will
be in the range from 0.05% to 0.2% by weight of the composition. Preferably it will be used in a concentration in the range from 0.09% to 0.1% by weight. Stearic acid is the preferred fatty acid but other fatty acids and fatty acid-containing materials may be used in lieu of stearic acid. For example, lard oil, oleic acid, palmitic acid, lauric acid, wool, fatty acids, tallow oil, linoleic acid and the like may be used.

The other major component of the composition of the present invention is a solid having lubricating properties selected from the class consisting of talc and mica. The amount of the solid having lubricating properties is dependent on the desired viscosity of the improved grease but generally the solid may be present in a concentration of about 33%. Stating this otherwise, the ratio of the solid such as talc or mica to the alkaline base oil should be at least 1:2 and generally should not exceed about 70% by weight of the composition or a ratio of 2:1 with respect to the alkaline base oil. If too much of the solid such as talc or mica is used, the grease is very viscous so that the upper limit of the solid concentration depends on the viscosity of the grease desired. A grease composition which has been used commercially in bending pipe having large diameters is given in the following table:

<table>
<thead>
<tr>
<th>Compound</th>
<th>Weight Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Base Oil</td>
<td>30.0</td>
</tr>
<tr>
<td>Talc</td>
<td>25.0</td>
</tr>
<tr>
<td>Diethylene glycol</td>
<td>15.0</td>
</tr>
<tr>
<td>Cyclohexylamine</td>
<td>10.0</td>
</tr>
<tr>
<td>Stearic Acid</td>
<td>5.0</td>
</tr>
<tr>
<td>Talc</td>
<td>5.0</td>
</tr>
</tbody>
</table>

The grease having the foregoing composition is successfully used in bending pipe in a large petroleum refinery. Equipment used for bending pipe of large diameter operates by holding the pipe to be bent adjacent to a large circular wheel while supplying a block to the surface of the pipe opposite the pipe surface in contact with the wheel. The pipe and the wheel are slowly rotated with respect to one another. A close fitting, highly polished metal plug is placed in the pipe so that it travels inside the pipe just ahead of that portion of the pipe that is being bent, thus preventing the formation of wrinkles in the inner portion of the bend. The plug travels through the pipe ahead of the bend by virtue of the pressure exerted upon it by the attempt of that portion of the pipe which is being bent to collapse. In order for this plug to travel smoothly inside the pipe, it is necessary that the inner surface of the pipe be well lubricated. Ordinary oil will not suffice for this purpose because the heat caused by the bending operation makes the oil so fluid that it runs entirely to the lower surface of the pipe, thus leaving large areas of the pipe insufficiently lubricated. The usual preparation used for this lubrication is a grease which is moderately viscous at room temperature and which contains large quantities of graphite. This grease is sprayed on the inner surface of the pipe by means of a suitable moving spraying device and the plug is then inserted through the open end of the pipe and slid over this lubricated surface to the point at which the bend is to be started. When the bending operation is complete, the plug and excess grease are removed. This grease, by virtue of the large quantity of graphite contained therein, is very messy to handle and difficult to clean from the equipment and the operator and, therefore, unsatisfactory. In addition, when it is wiped from the plugs before they are stored, it leaves the highly polished surface of the plugs exposed to the air which causes them to corrode unless they are protected by means of a compound which must be coated over them until they are again to be used.

The composition of the present invention which includes a solid which does not soil surfaces with which it comes in contact serves to give the needed viscosity to the lubricating composition and furthermore it contains ingredients which allow it to be readily removed by washing with water thus making it easy to clean the metal plugs employed in such pipe bending operations. The presence of the corrosion inhibitor prevents rusting of the surfaces which have been treated with the grease and protects them from corroding during storage periods.

The composition of the present invention has been accepted commercially in pipe bending operations due to its stainless qualities and ease of removal by virtue of its being readily soluble with water.

The nature and objects of the present invention having been fully described and illustrated, what I desire to claim as new and useful and to secure by Letters Patent is:

1. A stainless, emulsifiable grease composition which comprises 25% to 75% by weight of a base oil containing alkali metal petroleum sulfonates in an amount in the range between 10% and 15% by weight of said base oil, the remainder being a hydrocarbon in the lubricating oil boiling range, 0.5% to 2.0% by weight tall oil, 0.5% to 2.0% by weight of a polyhydroxy alcohol, 0.3% to 1% by weight of an oil soluble corrosion inhibitor, 0.05% to 0.2% by weight of a fatty acid, and a solid having lubricating properties selected from the class consisting of talc and mica in a ratio in the range between 2:1 and 2:1 to said base oil.

2. A stainless, emulsifiable grease composition which consists of about 60% by weight of a base oil containing alkali metal petroleum sulfonates in an amount in the range between 10% and 15% by weight of said oil and the remainder a hydrocarbon oil having a viscosity at 100° F. of 75 to 500 SSU, about 0.5% by weight tall oil, about 0.5% by weight diethylene glycol, about 0.6% by weight cyclohexylamine, about 0.1% by weight stearic acid and about 3% by weight of a solid having lubricating properties selected from the class consisting of mica and talc.

3. A composition in accordance with claim 2 in which the hydrocarbon oil is substantially free of aromatic hydrocarbons.

JERE C. SHOWALTER,

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