APPLICATION FOR A PATENT
(Combined Form – Convention and Non-Convention)

By we, MOBIL OIL CORPORATION, a corporation organized and
existing under the laws of the State of New York, of 150 East
42nd Street, New York, New York, United States of America,
hereby apply for the grant of a Patent for an invention entitled
CERTAIN OXAZOLINES AS LOAD-CARRYING ADDITIVES FOR
GEAR OILS

which is described in the accompanying Complete Specification.

2. This application is a Convention Application and is based on the application(s) for a
patent or similar protection made
in United States of America
on October 3, 1977, numbered 838,591, and
on , numbered , and
on , numbered

3. My/Our address for service is: Care of COWIE, THOMSON & CARTER Patent
Attorneys, of Suite 5, 65 Queens Road, Melbourne, Australia, 3004

DATED this 19th day of September 1978.

COWIE, THOMSON & CARTER.

By: Patent Attorneys for
MOBIL OIL CORPORATION.

To the Commissioner of Patents,
COMMONWEALTH OF AUSTRALIA
Declaration in Support of an Application for a Patent

(Combined Form - Convention and Non-Convention)

In support of the Convention application made for a patent for an invention entitled CERTAIN OXAZOLINES AS LOAD-CARRYING ADDITIVES FOR GEAR OILS

EDWARD HATCH, VALANCE, ASSOCIATE PATENT COUNSEL of MOBIL OIL CORPORATION, 150 East 42nd Street, New York, State of New York, United States of America

do solemnly and sincerely declare as follows:

1. I am authorised by MOBIL OIL CORPORATION to make this declaration on its behalf.

2. The basic application(s) as defined by section 141 of the Act was made at Washington, D. C. in the United States of America on the 3rd day of October, 1977, No. 838591 by HARRY JOHN ANDREWS, JR. of 501 East Elm Street, Wenonah, New Jersey, U.S.A.

The above named basic applicant is the assignee of the invention from the said actual inventor(s).

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

DECLARED AT
New York, New York, U. S. A.
Date: September 14, 1978

MOBIL OIL CORPORATION

BY: Edward H. Valance
Associate Patent Counsel
Oxazolines as load-carrying additives for gear oils

Mobil Oil Corp.
Andress, H.J. Jr.
CM

Claim

1. A lubricant composition comprising a major amount of an oil of lubricating viscosity or greases thereof and a load-carrying amount of an additive selected from the group consisting of a naphthenyl oxazoline, an alkenylsuccinic mono-oxazoline, and an alkenylsuccinic bis-oxazoline.
PATENTS ACT 1952

COMPLETE SPECIFICATION
(ORIGINAL)

FOR OFFICE USE

Short Title:

InCl:

Application Number:
Lodged:

Complete Specification—Lodged:
Accepted:
Lapsed:
Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: MOBIL OIL CORPORATION, a corporation organized and existing under the laws of the State of New York, of 150 East 42nd Street, New York, New York, United States of America.

Address of Applicant:

Actual Inventor: HARRY JOHN ANDRESS, JR.

Address for Service: C/- COWIE, THOMSON & CARTER, PATENT ATTORNEYS, SUITE 5, 65 QUEENS ROAD, MELBOURNE, VICTORIA, 3004.

Complete Specification for the invention entitled:
CERTAIN OXAZOLINES AS LOAD—CARRYING ADDITIVES FOR GEAR OILS

The following statement is a full description of this invention, including the best method of performing it known to me:

Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.
CERTAIN OXAZOLINES AS LOAD-CARRYING
ADDITIVES FOR GEAR OILS

This invention relates novel lubricant compositions containing certain oxazolines useful as load-carrying agents for gear oils.

This invention provides a lubricant composition comprising a major amount of an oil of lubricating viscosity or greases thereof and a load carrying amount of an additive selected from the group consisting of a napthenyl oxazoline or an alkenylsuccinyl mono- or bix-oxazoline.

The oxazoline employed in the present invention is a napthenyl oxazoline or an alkenylsuccinyl mono- or bis-oxazoline. The napthenyl oxazoline is prepared by reacting equimolar amounts of naphthenic acid and tris(hydroxymethyl)aminomethane. The alkenylsuccinyl mono- or bis-oxazoline is made by reacting one mole of an alkenylsuccinic acid having 10 carbon atoms to 50 carbon atoms per alkenyl group with 1 or 2 moles of tris(hydroxymethyl)aminomethane. The reactions are carried out at a temperature between about 200°C and about 250°C, preferably using an aromatic hydrocarbon, such as benzene or toluene, to remove water by azeotropic distillation through a water take-off trap, e.g., a Dean-Stark trap.

The lubricant compositions of the present invention contain a small amount of the aforementioned additives sufficient to improve load-carrying properties. Generally, for most applications, the additive is present in an amount from about 0.1 to about
5% by weight and preferably in an amount from about 0.1 to about 1% by weight. The lubricants may comprise any materials that normally exhibit insufficient antiwear properties. A field of specific applicability is the improvement of liquid hydrocarbon oils boiling within the range from about 75°F to about 1000°F. The lubricant oils used may be of any suitable lubricating viscosity range from about 45 SSU at 100°F to about 6000 SSU at 100°F and, preferably, from about 50 to 250 SSU at 210°F. These oils having viscosity indexes from about 70 to about 95 are preferred. The average molecular weights of these oils may range from about 250 to about 800. In general, the lubricant may comprise any mineral or synthetic oil of lubricating viscosity.

In instances where synthetic oils, or synthetic oils employed as the vehicle for the grease, are desired in preference to mineral oils, or in combination therewith, various compounds of this type may be successfully utilized. Typical synthetic vehicles include polyisobutylene, polybutenyes, hydrogenated polydecenes, polypropylene glycol, polyethylene glycol, trimethylol propane esters, neopentyl and pentaerythritol esters, di(2-ethyl hexyl)sebacate, di(2-ethyl hexyl)adipate, dibutyl phthalate, fluoro-carbons, silicate esters, silanes, esters of phosphorous containing acids, liquid ureas, ferrocene derivatives, hydrogenated mineral oils, chain-type polyphenyls, siloxanes and silicones (polysiloxanes), alkyl-substituted diphenyl ethers typified by a butyl-substituted bis(p-phenoxy phenyl)ether, phenoxy phenylethers, etc.

The aforementioned additives may be incorporated as antiwear agents in grease compositions. Such oils can also include hydraulic oils, if so desired. When high temperature stability is not a requirement of the finished grease, mineral oils having a viscosity of at least 40 SSU at 150°F, and
particularly those falling within the range from about 60 SSU to about 6000 SSU at 100°F may be employed. The lubricating vehicles of the improved greases of the present invention, containing the above-described additives, are combined with a grease-forming quantity of a thickening agent. For this purpose, a wide variety of materials may be dispersed in the lubricating vehicle in grease-forming quantities in such degree as to impart to the resulting grease composition the desired consistency. Exemplary of the thickening agents that may be employed in the grease formulation are non-soap thickener, such as surface-modified clays and silicas, aryl ureas calcium complexes and similar materials. In general, grease thickeners may be employed which do not melt and dissolve when used at the required temperature within a particular environment; however, in all other respects, any material which is normally employed for thickening or gelling hydrocarbon fluids or forming greases can be used in preparing the improved greases.

The following examples illustrate the present invention.

Example 1

A mixture of 300 grams (1.0 mol) naphthenic acid and 121 grams (1.0 mol) tris hydroxymethylamino methane was refluxed in the presence of toluene diluent at about 215°C until evolution of water ceased. The product is a naphthenyl oxazoline.

Example 2

A mixture of 185 grams (0.5 mol) iso octadecenyl succinic acid and 121 grams (1.0 mol) tris hydroxymethylamino methane was refluxed in toluene at a temperature of about 250°C until evolution of water ceased. The product is an isooctadecenyl succinyl bis-oxazoline.
Example 3
A mixture of 900 grams (1.0 mol) of C_{18-24} dimer alkenylsuccinic anhydride and 121 grams (1.0 mol) tris hydroxymethylamino methane was refluxed in toluene to a temperature of about 240° C until evolution of water ceased. The product is an alkenylsuccinyl mono-oxazoline.

The Timken Load Test
Compositions according to the present invention were tested in the Timken Load Test. This test is a known test used to determine the load carrying properties of additives in lubricating oil compositions. The test is conducted by placing a steel test cup on a shaft which can be rotated at 800 rpm. Just below the cup in contact with it is a small stationary steel block. A load is placed on these parts by means of a lever arm which pushes the block upwards against the rotating cup, which acts as a roller bearing, while the lubricant flows between the two surfaces. The load is gradually increased at 10-minute intervals until failure occurs. Failure is determined by visual inspection during the running period.

The additives were blended in a conventionally refined mineral oil containing a sulfurized hydrocarbon, metal passivator, pour point depressant, antioxidant, demulsifier, antirust agent and defoamant. The results of the Timken OK Load Test are as follows:

<table>
<thead>
<tr>
<th>Additive</th>
<th>Conc %</th>
<th>Load in lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base oil blend</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>&quot;        + Example 1</td>
<td>0.1</td>
<td>60</td>
</tr>
<tr>
<td>&quot;        + Example 2</td>
<td>0.1</td>
<td>60</td>
</tr>
<tr>
<td>&quot;        + Example 3</td>
<td>0.1</td>
<td>60</td>
</tr>
</tbody>
</table>
The claims defining the invention are as follows:

1. A lubricant composition comprising a major amount of an oil of lubricating viscosity or greases thereof and a load-carrying amount of an additive selected from the group consisting of a naphthenyl oxazoline, an alkenylsuccinic mono-oxazoline, and an alkenylsuccinic bis-oxazoline.

2. The composition of Claim 1 wherein the additive is a naphthenyl oxazoline.

3. The composition of Claim 1 wherein the additive is an isoctadecenylsuccinyl bis-oxazoline.

4. The composition of Claim 1 wherein the additive is a C_{18-24} dimer alkenylsuccinyl mono-oxazoline.

DATED this 19th day of September, 1978.

MOBIL OIL CORPORATION.