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MILORI BLUE GREASE

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This invention has to do with new grease compositions, particularly extreme pressure grease compositions characterized by a high order of effectiveness throughout a wide range of severe operating conditions.

For many years, there have been developments of improved greases designed to meet ever-increasing demands for effective lubrication of machinery. However with considerable progress being made in industry, a need has arisen for greases having wide temperature range utility.

It is an object of this invention, therefore, to provide greases capable of operating up to about 500° F. Other objects will be apparent from the following description.

This invention is based upon the discovery that greases of excellent character can be prepared from an oil of lubricating viscosity and Milori Blue.

The gelling agent of this invention is Milori Blue. This pigment is of the genus Iron Blues which are represented by the general formulae:

$$Fe_4[Fe(CN)_6]_3.XH_2O$$

and

$$Fe[FeFe(CN)_6]_3.XH_2O$$

Milori Blue (Colour Index Number 77510) is prepared by oxidizing a paste of potassium ferrocyanide and ferrous sulfate, as described by Muller-Magdeburg in the Chemiker-Zeitung, 1927, No. 95, pages 923 and 924.

Milori Blue is stable at high temperatures, up to about 500° F. and beyond, and is well adapted for use in grease compositions formulated for high temperature operations.

Oils used in the greases of this invention can be mineral or synthetic oils of lubricating viscosity. When extreme temperature stability is not a requirement of the finished grease, mineral lubricating oils can be used. Suitable mineral oils have a viscosity (S.U.V.) of at least 40 seconds at 100° F., and particularly those within the range of about 60 seconds to about 6000 seconds at 100° F.

Synthetic vehicles can be used, instead of mineral oils, or in combination therewith. Typical synthetic vehicles are: polypropylene, polypropylene glycol, trimethylol propane esters, neopentyl and pentaerythritol esters, di-(2-ethyl hexyl) sebacate, di-(2-ethyl hexyl) adipate, dibutyl phthalate, polyethylene glycol di-(2-ethyl hexoate), fluorcarbons, silicate esters, silanes, polysilphenylenes, esters of phosphorus-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, polyphenyl ethers, etc.

Particularly preferred herein, are mineral oils and silicones.

In the grease compositions of this invention, Milori Blue is used in quantities from about 10 to about 50 percent by weight, and preferably from about 15 to about 30 percent by weight. The vehicles described above constitute the balance of the compositions, except for relatively small quantities of the following characterizing materials which may be present.

It is to be understood that such other characterizing materials can be antioxidants, corrosion inhibitors, viscosity index agents, fillers, extreme pressure agents, fluid stabilizers (e.g. iron octoate), etc. Among such materials are colloidal silica, calcium acetate, calcium carbonate and molybdenum disulfide. These characterizing materials generally do not detract from the lubricating value of the compositions of this invention, nor do they detract from the beneficial character of Milori Blue; rather, these characterizing materials serve to impart their customary properties to the particular compositions in which they are incorporated.

The greases of this invention are prepared by dispersing Milori Blue in the vehicle. This can be accomplished by any mixing technique wherein solid particles are wetted by a fluid. Typical equipment for such use includes a colloid mill, 3-roll ink mill, Manton-Gaulin homogenizer and the like. Other advantageous techniques are the spray or jetting techniques described in U.S. Patent Numbers 2,950,248 and 2,950,249, issued August 23, 1960.

A typical illustrative grease composition of this invention was prepared by dispersing seventeen percent by weight of Milori Blue in a paraffinic mineral oil having an S.U.V. of 100 seconds at 100° F. One hundred parts by weight of Milori Blue and 200 parts by weight of the oil were mixed in a Waring Blendor for 15 minutes. Four hundred parts by weight of the same oil was then added. The resulting mixture was run once through a colloid mill, clearance 0.005 inch, and then once with a clearance of 0.003 inch. The grease so obtained has a ½ scale penetration of 177.

This grease has an ASTM unworked penetration of 335. When subjected to the four ball Navy test, the wear rate (microns per minute) was only 3.6 in comparison with 8.0 for the same mineral oil run as a blank. The average coefficient of friction for the grease was only 0.095, as compared with 0.110 for the mineral oil blank. The four ball test was carried out with a 40 kilogram load, at 300° F. and 600 revolutions per minute, for 60 minutes.

As indicated above, the new lubricants can be used for a wide range of industrial applications. One typical application is the lubrication of aircraft equipment.

Although the present invention has been described with preferred embodiments, it is to be understood that modifications and variations may be resorted to, without departing from the spirit and scope of this invention, as those skilled in the art will readily understand. Such variations and modifications are considered to be within the purview and scope of the appended claims.

We claim:

1. A grease comprising an oil of lubricating viscosity and a grease-forming quantity, from about 10 to about 50 percent by weight of the grease, of Milori Blue.

2. A grease defined by claim 1 wherein the oil is a mineral oil.

3. A grease defined by claim 1 wherein Milori Blue is present in an amount from about 15 to about 30 percent by weight of the grease.

References Cited in the file of this patent

The Condensed Chemical Dictionary, Fifth Edition, Reinhold Publ. Corp., New York, 1956, page 730.

"Manufacture and Application of Lubricating Greases," by Boner, Reinhold Publ. Corp., New York, 1954, pages 690–697.