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ANTIFRICTION BEARING LUBRICANT

Arnold J. Morway, Clark Township, Union County, and Alan Beerbower, Kenilworth, N. J., assignors to Standard Oil Development Company, a corporation of Delaware

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1 Claim. (Cl. 252—41)

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The present invention relates to improved lubricating compositions, particularly unctuous transparent compositions suitable for the lubrication of anti-friction bearings such as ball bearings and roller bearings, and more particularly, to improvements in unctuous transparent greases compounded of mineral oil and sodium soaps and methods of preparing same.

Greases of this type should be stable over a long period of time so that in storage they will not oxidize and break down to liberate corrosive products. It is the practice of anti-friction bearing manufacturers to store their product packed with lubricant. If this lubricant were to break down and liberate corrosive acids, the decomposed grease in the bearing would cause corrosion of the bearing with resultant sticking or locking of the bearing by corrosion products. In operation, the bearing, although of the anti-friction type, does have some friction and operating at high speeds generates heat which raises the temperature of the bearing appreciably above the temperature of the surrounding atmosphere. Unless precaution is taken, this higher temperature will cause the lubricant to oxidize, depositing a coating of so-called varnish over the surface of the bearing. This varnish is gummy and sticky and reduces the efficiency of the bearing, or even causes it to lock and render it useless. It is customary to put anti-friction bearings in operation in a wide variety of places where a likewise wide variety of temperature conditions prevail. Lubricated for life bearings are now being used in a number of inaccessible places, and it is obvious that the life of the bearing and the machine will depend on the life of the lubricant. The lubricant must therefore be capable of withstanding a wide variation in temperature without loss of lubricating value, oxidation and gum formation. Besides being chemically stable, lubricants of this type should not separate physically. This phenomenon of physical separation is known as bleeding.

Sodium soap greases, while being chemically stable and possessing a long storage life and possessing the ability to furnish lubrication over a wide range of temperatures, are characterized by a tendency to oxidize and deposit gummy substances when in use and are prone to separate physically, and also change in structure from smooth or short fibered products to rubbery, ropey masses sometimes at relatively low temperatures. An object of this invention is to stabilize such sodium soap greases.

Another object of this invention is to stabilize

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sodium soap greases that are of known lubricating value without materially changing their lubricating qualities. These and other objects of the invention will be apparent from the following description of the invention.

It has been discovered that the metallic soaps of tin and the metals appearing in the right hand column of group 2 of the periodic table, with the exception of mercury, possess the unusual property of stabilizing unctuous transparent sodium soap greases against bleeding. They also act as oxidation inhibitors to a slight extent by themselves. However, in combination with an amine inhibitor, they add considerable potence to the amine inhibitor. The metals, beryllium, magnesium, zinc, cadmium, and tin, fall within the group contemplated by this invention. It has been further found that these metallic soaps maintain and closely control the per cent of free acidity necessary for the production of the desired grease structure. These soaps are added to the grease in the range of from 0.2%–1% by weight and preferably about 0.5%.

The acids utilized for the production of the metallic soaps may be either hydrogenated fish oil acids, palmitic, stearic, oleic, naphthenic acids, or oxidized wax acids, or any other fatty acid of over nine carbon atoms. These metallic soaps are formed by the neutralization of the acid in the following manner: The acid is reacted with sodium hydroxide in hot aqueous solution to form a neutral sodium soap. To this solution is then added a solution of a soluble salt of the metal desired, and the metallic soap precipitates as a powder or gummy mass. The soap is then washed free of sodium salts and dried, and is ready for use. In some cases, such as with zinc naphthenate, the metallic soap may be formed by direct reaction of the metal oxide and the acid at temperatures up to 350° F. Although a wide range of lubricating oils may be employed, in general, the base oil comprises an oil having a viscosity in the range of from about 35 to 110 sec. at 210° F., a viscosity index of above 20 Dean and Davis, and a good resistance to oxidation. However, in preparing compositions of this character, we prefer to use a base oil having a viscosity of from 40 to 55 seconds S. U. V. at 210° F.

The invention will be more readily understood from the following examples:

An unctuous transparent anti-friction bearing lubricant of the following composition: 13% stearic acid, 0.5% zinc stearate, 1.95% caustic soda, 84.50% of a light paraffinic oil of 45 Saybolt seconds at 210° F. (Forum 45) was com-

pounded by heating 260 parts of stearic acid and 400 parts of paraffin oil to a temperature of from 140–150° F. in a kettle equipped with a suitable stirring mechanism and the temperature maintained until the stearic acid was completely melted. The caustic soda was then added in the form of a 40% solution and stirring started. The temperature was then raised to 220–240° F. and 500 parts of oil added, and the mixture stirred until a homogeneous mass was obtained. A small sample was taken for free alkalinity determination. The free alkalinity at this point should be between 0.03 and 0.06% as NaOH. Adjustment to bring the free alkalinity in this range is made if necessary. The zinc stearate was then dispersed in the balance of the paraffin oil and the dispersion of zinc stearate and oil added to the kettle. The temperature was then again raised to the melting point of the grease or until the grease became fluid. Approximately 0.2% phenyl-a-naphthylamine, or other inhibitor or dye was added after dispersion in a small portion of the mineral oil held out for this purpose. The grease was then permitted to cool and after cooling was worked smooth. The physical properties of the grease are as follows:

A. S. T. M. unworked penetration at 77° F.... 264
A. S. T. M. worked penetration at 77° F..... 264
A. S. T. M. dropping point.....°F.. 348
Norma Hoffman oxidation test at 175° F.
110 pounds O_2 pressure.....hours.. 300

B. E. C. test: The grease receives an excellent rating showing no leakage thru bearing seal, no aeration or oil separation and only a very slight change in consistency after testing at 220° F. and cooling to room temperature.

The same method of manufacture may be applied in the use of the other metal soaps and the physical properties of the greases prepared by the above method using soda soaps, and the soaps of other metals and acids are practically the same as the physical properties of the sodium stearate-zinc stearate grease described above.

What is claimed is:

An unctuous, transparent anhydrous grease containing from .03–.06% free alkalinity as NaOH and composed of mineral lubricating oil thickened to smooth grease consistency with a mixture of soda and zinc soaps in which the ratio of soda soap to zinc soap is between 14:1 and 28:1.

ARNOLD J. MORWAY.
ALAN BEERBOWER.