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STABILIZED GREASE COMPOSITIONS

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2 Claims. (Cl. 252—40.7)

1

This invention relates to the stabilization of grease compositions and particularly to the incorporation of a texture stabilizing agent such as tetra methyl diamino diphenyl methane in greases.

Recent developments in the design of mechanical equipment have set up more exacting conditions of lubrication which necessitates an improvement in the manufacture and production of grease compositions. These improvements which are required call for an increase in lubrication life, uniform lubrication under high loads and increased temperature, together with minimum texture change during operation under conditions of high shearing stresses. Under conditions of operation where high shearing stresses are involved, such as in ball and roller bearing lubrication, the structure of the conventional greases gradually break down and their consistency falls off until they become liquid or semi-liquid. At this point the greases no longer adhere to the lubricating surfaces and bearing failures result.

It is accordingly an object of this invention to provide improvements in grease compositions so as to render them capable of continued operation under conditions of high shearing stresses with negligible change in structure and approximately constant consistency as well as providing improved over-all lubrication under severe operating conditions.

According to the invention as described herein, a texture stabilized grease composition may be obtained by incorporating in a grease a small amount of tetra methyl diamino diphenyl methane. This compound acts as a stabilizer in resisting undesirable texture changes in the grease during operation under high shearing stresses and may be applied to greases ranging from the soft greases having sufficient soap to thicken the mineral oil to a soft gel to the sponge and brick type greases containing up to 40% soap and are hard gels. These greases may contain either a soda soap base, mixed soda-lime soap base, or a lime soap base and may be compounded with a distillate, residual, or a cylinder stock oil within the range of 70 Saybolt viscosity at 100° F. to 200 Saybolt viscosity at 210° F. The amount of tetra methyl diamino diphenyl methane which may be incorporated in a grease to attain texture stability depends upon the composition of the particular grease and its susceptibility to texture change in service and is usually within the range of 0.05–5.0% by weight of the finished grease. However, in a majority of greases, optimum results may be obtained by the use of from 0.05 to 2.0% by weight of the stabilizer.

2

As an example of the method of producing a stable mixed base grease, a mineral oil of approximately 200 Saybolt viscosity at 100° F. and stearic acid are mixed and the mixture heated to about 140° F. with agitation. To the heated mixture there is added sodium hydroxide in an amount calculated to yield between 18–22% by weight sodium soap, based on the finished grease, and thereafter adding lime in an amount required to saponify the remaining fatty acid. The heating and agitation is continued until the temperature reaches approximately 240° F. at which time additional mineral oil is gradually added. After the addition of the total volume of the mineral oil, the temperature is gradually lowered to approximately 200° F. at which time a solution of tetra methyl diamino diphenyl methane in oil is added in an amount sufficient to yield 0.1% by weight of a stabilizer in the finished product. The grease is then agitated to a homogeneous mixture and drawn.

Instead of incorporating the stabilizing agent during the manufacture of a grease, it may be worked into the finished grease as desired. For example, a soda base wheel-bearing grease containing 10–16% sodium soap may be stabilized by working into the grease a solution of tetra methyl diamino diphenyl methane in a cylinder stock, of 170–179 Saybolt viscosity at 210° F., at approximately 100° F., with agitation and heating, and continuing the agitation and heating until a temperature of approximately 150° F. is reached and then drawing the stabilized grease. The amount of solution added to the grease is calculated to provide 0.7% by weight tetra methyl diamino diphenyl methane in the final grease.

As an example of the stabilization of a lime base cup grease containing 14–18% lime soap, a solution of tetra methyl diamino diphenyl methane dissolved in a lubricating oil of an SAE-20 grade, in the ratio of 25 grams of the former to 100 cc. lubricating oil, is worked into the grease until 0.5% by weight of the stabilizer is present. The inhibited grease is then stirred for one hour at 140–155° F. before drawing.

The texture-stabilizing properties of tetra methyl diamino diphenyl methane are illustrated by tests conducted on a so-called "torque-breakdown" machine. In this test 32 grams of the test grease were packed in a Federal ball bearing and the bearing assembled in its proper housing and mounted on a shaft maintained in a constant temperature chamber. The chamber tempera-

ture was adjusted to a bearing temperature of 80° F. After a constant temperature was obtained, the motor (1750 R. P. M.) connected to the shaft was started and the starting torque recorded. During the two-hour test period periodic torque and temperature readings were made. At the conclusion of the run the bearing was removed, weighed and the disposition of the grease in the bearing and the housing, together with any leakage was noted. Miniature penetrations of the grease were taken before and after the test.

The results obtained on an uninhibited lime base cup grease and the inhibited lime base cup grease described immediately preceding are as follows:

Torque-breakdown test

	Blank	Blank+0.5% methane base
Starting Torque, g.-cm.	4300; 4300	4300; 3400
Running Torque, g.-cm.	1030; 800	800; 910
Maximum Temp., ° F.	115; 116	100; 99
Running Temp., ° F.	115; 116	100; 99
Grease on Bearing, per cent	60.9; 60.9	93.5; 93.5
Grease in Housing, per cent	39.1; 39.1	6.5; 6.5
Grease Leakage	0.0; 0.0	0.0; 0.0
Miniature Penetration: [1]		
Original Grease	62; 62	55; 55
Grease from Bearing	93; 100	59; 52

[1] "Miniature Penetrometer for Determining the Consistency of Lubricating Greases," Ind. Eng. Chem., vol. 1, page 108, February 15, 1939.

The results obtained from the foregoing test indicate the lower running temperature and exceptional texture stability of the grease inhibited with the stabilizer of the invention. The miniature penetrations show that the structure of the inhibited grease is practically the same after the test as it was originally, whereas the uninhibited grease is softened materially. Furthermore, the inhibited grease shows a marked improvement with respect to the distribution of the grease after the test, which is recognizable as an advantage in lubrication.

This application is a continuation-in-part of my copending application Serial No. 413,975, filed October 7, 1941 (now abandoned).

Obviously many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore, only such limitations should be imposed as are indicated in the appended claims.

What I claim is:

1. A grease composition stabilized against texture change, comprising a homogeneous mixture of a mineral oil, sufficient metallic soap to thicken the mineral oil to a gel and 0.05–5.0% by weight of tetra methyl diamino diphenyl methane.

2. An improved grease composition comprising a texture stable system composed of a homogeneous mixture of mineral lubricating oil, sufficient lime soap to thicken the lubricating oil to a gel, and 0.05–5.0% by weight of tetra methyl diamino diphenyl methane.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,065,857	Hilliker	Dec. 29, 1936
2,121,748	Suit	June 21, 1938
2,323,670	Musselman	July 6, 1943
2,346,357	Burke et al.	Apr. 11, 1944
2,374,966	Zimmer et al.	May 1, 1945
Re. 20,784	Musselman et al.	July 5, 1938