This invention relates to improvements in greases for high temperature use, and more particularly to such greases containing large proportions of petrodatum.

A variety of petrotatums have been used in the manufacture of lubricating greases, but as far as known they have constituted relatively minor proportions of the grease. In the manufacture of greases suitable for high temperature use or greases having a relatively low penetration, it has almost invariably been necessary to employ high percentages of soaps. For example, it appears from published data that a soap content of from 25% to 30% is necessary in order to provide a grease with a penetration of about 140. Only about half that amount of soap is used in the greases of this invention.

In accordance with the present invention, it has been discovered that an excellent high temperature grease may be made from a moderate proportion of lithium stearate in petrodatum. This was an unexpected result because previous work had shown that a grease could not be made from Pennsylvania type oils and lithium stearate alone. A similar difficulty had been previously experienced in attempts to make greases from sodium soaps and Pennsylvania oils, which are classed as oils of low polarity (Klemgard "Lubricating Greases," 1937, pages 362 to 363). Petrodatum are regarded as extremely nonpolar, but excellent dispersions of lithium soap in petrodatum have been secured by the practice of the present invention.

The manufacture of greases in accordance with this invention may be illustrated by reference to the following example in which the quantities of the various ingredients are given in percentages by weight.

A grease having a penetration of 140 (worked A.S.T.M. type) was prepared by melting and intimately mixing 11% by weight of lithium stearate, 2.2% by weight of aluminum stearate, 0.5% by weight of tributyl phosphite and 76.3% by weight of green petrodatum. The tributyl phosphite is used as an antioxidant. This grease in addition to having the penetration indicated, had a dropping point of 370° F. The grease furthermore stood the seven-hour test in the Navy bearing testing apparatus in which a bearing is rotated under forced circulation at 3600 revolutions per minute while the grease is heated to a temperature of 350° F. At the end of this test the grease was still in good condition and was superior to known commercial greases. The lithium stearate used in making the petrodatum grease was free of glycerine, and in fact a substantially pure product made from lithium carbonate and stearic acid. The petrodatum used may be refined instead of the crude product. The more refined and whiter the petrodatum, the lighter color is the resulting grease. Greases made in accordance with the present invention may be made from somewhat variable quantities of stearate or other lithium soap and aluminum stearate or stearic acid and aluminum soap, the balance of the grease in each case consisting essentially of petrodatum. The proportion of lithium soap may vary from about 8% to 14%, while the proportion of aluminum soap may vary from 1.5% to 4%, the higher proportions of aluminum soap being used with the higher proportions of lithium soap. Greases made in accordance with the present invention are preferably made without the use of mineral or other oils.

A softer grease than the 140 penetration grease described above may be made by including from 1% to 4% of a lead or a silver soap, for example the oleates. The inclusion of 2% of lead oleate in the composition described above raises the penetration to about 240, and gives a grease which still has the high temperature characteristics. The use of this additional soap seems to give an effect different from that normally expected since it is generally found that the larger the proportion of soap, the lower the penetration of the grease. The lead or silver soap in the percentage range referred to, may be used in the making of other specific greases containing different proportions of lithium soap or in making greases containing lithium soap and aluminum soap in the range of proportions referred to above. The aluminum soap seems to aid in dispersing the lithium soap in the petrodatum.

Antioxidants such as tributyl phosphites, are not essential to the production of a good grease in accordance with the present invention, but such an antioxidant is preferably employed to aid in prolonging the life of the grease and to inhibit oxidation and corrosion. Other known inhibitors may be employed such as other alkyl phosphites, aryl phosphites and amino compounds.

Although the features of the invention have been described and illustrated in accordance with certain specific examples, it is to be understood that the invention is not to be limited thereto or otherwise be restricted, except by the prior art and the scope of the appended claims.

Having described the invention and illustrated the same in accordance with certain examples, what is claimed as new is:

The lithium stearate used in making the petrodatum grease was free of glycerine, and in fact a substantially pure product made from lithium carbonate and stearic acid. The petrodatum used may be refined instead of the crude product. The more refined and whiter the petrodatum, the lighter color is the resulting grease. Greases made in accordance with the present invention may be made from somewhat variable quantities of stearate or other lithium soap and aluminum stearate or other aluminum soap, the balance of the grease in each case consisting essentially of petrodatum. The proportion of lithium soap may vary from about 8% to 14%, while the proportion of aluminum soap may vary from 1.5% to 4%, the higher proportions of aluminum soap being used with the higher proportions of lithium soap. Greases made in accordance with the present invention are preferably made without the use of mineral or other oils.

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Antioxidants such as tributyl phosphites, are not essential to the production of a good grease in accordance with the present invention, but such an antioxidant is preferably employed to aid in prolonging the life of the grease and to inhibit oxidation and corrosion. Other known inhibitors may be employed such as other alkyl phosphites, aryl phosphites and amino compounds.

Although the features of the invention have been described and illustrated in accordance with certain specific examples, it is to be understood that the invention is not to be limited thereto or otherwise be restricted, except by the prior art and the scope of the appended claims.

Having described the invention and illustrated the same in accordance with certain examples, what is claimed as new is:
1. A high temperature grease comprising approximately 11% by weight of lithium soap, 22% by weight of aluminum soap, the remainder being essentially petrolatum.

2. A high temperature lubricant having an A. S. T. M. penetration of about 140 and consisting essentially of from 8% to 14% by weight of lithium stearate, from 1.5% to 4% of aluminum stearate, the remainder of the lubricant being composed essentially of petrolatum.

3. A high temperature grease consisting of petrolatum having dispersed therein from about 8% to about 14% by weight of a lithium soap based on the weight of the grease.

4. A high temperature relatively hard grease consisting essentially of petrolatum, from 8% to about 14% by weight of a lithium soap, and from 1% to 4% by weight of a soap having a softening effect on the grease and selected from the group consisting of lead and silver soaps.

5. A high temperature grease comprising approximately 11% by weight of lithium stearate, approximately 2.2% by weight of aluminum stearate, approximately 0.5% by weight of an antioxidant, and approximately 76.3% by weight of petrolatum.

6. A grease as defined by claim 5 which includes a relatively small proportion of a soap selected from the group consisting of lead and silver soaps.

7. A lubricant consisting of a petrolatum in which is dispersed approximately 11% by weight of a lithium soap based on the weight of the grease and a dispersion medium comprising an aluminum soap.

8. A grease as defined by claim 7 containing a soap having a softening effect on the grease and selected from the group consisting of lead and silver soaps.

9. A high temperature lubricant consisting of petrolatum having dispersed therein from about 8% to about 14% by weight of lithium stearate based on the weight of the grease.

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