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BARIUM GREASE

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This invention relates to the preparation of lubricating greases, and to the greases thereby produced, this application being a continuation, in part, of our earlier application Serial No. 611,930, filed May 17, 1932 now issued as Patent No. 2,033,148 of March 10, 1936.

The principal object of this invention is to simplify the procedure described in the above mentioned application and to produce barium soap greases of high quality, of which the soap content consists of a mixture of the basic and normal barium soaps of various fatty acids, the basic soap comprising a preponderant proportion of the total soap content. The advantage of barium greases resides in the fact that they possess in general both the water resistant characteristics of calcium soap greases, as well as the high melting point characteristics exhibited by sodium soap greases.

In general, the procedure for the preparation of barium soap greases consists in saponifying a suitable fat, or mixture of fats, by means of barium hydroxide, the relative proportions of fat and base used depending on the relative proportions of basic and normal barium soaps which are desired in the final product, the resulting barium soap being employed for thickening mineral oils which possess suitable solvent properties for the soap. Suitable soap stocks consist of tallow, alone or in admixture with varying proportions of cottonseed oil or lard oil, although other combinations, such as the inclusion of suitable proportions of linseed oil or horse fat, will naturally occur to one skilled in the art. Characteristic of the lubricating oils which possess adequate solvent properties for the barium soaps are the asphaltic or naphthenic base oils commonly known as Western oils. Oils of lower solvent power may be used however, by increasing the proportion of normal barium soap, or by employing increased proportions of the glycerides of the highly unsaturated fatty acids such as linoleic or linolenic acids. Such a procedure is not to be preferred however. The procedure resides in heating the soap making materials to approximately the boiling point of water in order to hydrolyze the glycerides, and to effect the formation of normal barium soap, represented by the formula BaR_2 , (in which "R" represents any fatty acid radical) there being employed however, a calculated excess of barium hydroxide sufficient to produce, when combined with the normal barium soap, the desired preponderance of basic barium soap, BaROH , together with a slight excess of free barium hydroxide in the finished

grease. A portion of the total mineral oil is added gradually as the temperature is raised by the application of heat until, as a temperature of 300° F. is approached, the formation of basic barium soap begins. Since the reaction is exothermic, heating and the addition of oil are then discontinued but the temperature continues to rise to a range between about 350° F. to 375° F.; preferably it is not allowed to exceed about 375° F. If necessary, the temperature may be prevented from exceeding this maximum value by the addition of increments of oil or by means of a cooling medium such as water introduced into the kettle jacket or coils. The temperature is maintained within this range, for example for one to two hours, to reduce the free barium hydroxide content. When the free barium hydroxide content has been reduced to approximately 0.50%, or lower, but preferably to not less than 0.2%, more oil is added, the grease being thus cooled by the oil to a temperature of approximately 300° F. and maintained around this temperature during the addition of the final portion of the oil. After all of the oil has been added, the resulting grease is heated to about 330° F. and is drawn at about that temperature. By properly regulating this procedure, the grease produced will be the most satisfactory product and contain a soap which will possess the proper ratio of basic to normal soap to constitute the preponderantly basic soap desired, and this ratio is produced without the necessity for adjustment by means of the addition of free fatty acids or otherwise.

The use of the present process avoids subsequent addition of fatty acids or the like as in the earlier application. Also, according to the present process, the substantially complete dehydration as finally required in the grease is deferred until the last stage, as distinguished from early dehydration followed by rehydration and final substantial dehydration of the grease. The necessity for passing through a gelling stage is also avoided. Since, in operating this process, the soap initially formed is the normal barium soap, the quantities of barium hydroxide initially added need be only those sufficient to form a normal soap and the remainder of the calculated quantity of barium hydroxide necessary to produce a desired basic barium soap may be added after the formation of the normal soap, to be followed by required further heating to convert normal soap to basic soap in the desired proportions; the amount of additional barium hydroxide being reg-

ulated according to the proportion of basic soap to be produced.

The invention, therefore, may be stated as residing in a method of producing barium soap grease containing large proportions of basic barium soap to normal barium soap wherein the mineral oil employed is one having good solvent properties for the soap, the invention particularly including the employment of suitable fats and barium hydroxide in proportions calculated to yield directly during the grease making process the desired proportion of basic barium soap with only a slight excess of free barium hydroxide. The invention also involves such a method wherein the resultant grease contains a preponderant proportion of basic barium soap with respect to normal barium soap. The invention also resides in such methods wherein the proportion of normal barium soap to basic barium soap may be varied with the type of fatty material employed. The invention further includes the control of the grease making procedures within reasonably well defined temperature ranges as herein disclosed, in order to effect production of grease containing basic and normal soap in the proper proportions directly from the materials used. The invention further comprises such regulation to produce the stated ends without the addition of further agents such as additional quantities of fats or fatty acids. The invention includes also the heating of the soap making materials to approximately the boiling point of water and the continuance of such heating until hydrolysis of fatty materials and the formation of normal barium soap are substantially complete and foaming caused by the partial elimination of the water of crystallization of the barium hydroxide has subsided, whereby also partial dehydration of the soap necessarily ensues. The invention further involves the additional steps of heating the mass to a temperature range above approximately 300° F., the temperature being increased to effect reaction between normal soap and substantially all of the excess barium hydroxide to produce the required basic barium soap, cooling being effected if necessary to avoid excessive temperature, followed by the addition of further oil and an accompanying lowering of temperature. The invention also includes the maintenance of the reaction temperature in the upper portion of the temperature range, and more especially between about 340° F. and not exceeding about 375° F. until substantially all of the free barium hydroxide has reacted or is reduced to less than about 0.5%. The invention also includes the steps of cooling the grease by addition of the rest of the oil to bring its temperature to 300° F. or lower, the grease preferably being then elevated somewhat in temperature, e. g. to 330° F., depending somewhat upon the solvency of the oil for the soap, the ratio of normal to basic soap and the nature of the fats used, this temperature effecting completion of grease formation and being approximately the drawing temperature.

The invention further resides in adjusting the proportion of basic barium soap to normal barium soap in accordance with the solvent power of the lubricating oil for the soap. Thus, we have discovered that as the viscosity of oils of the asphaltic or naphthenic base type increases, their solvent power for basic barium soap decreases, and in order to make the best grease from a given oil the proportion of basic to normal soap should be accordingly adjusted, this adjustment being

independent of the variation of proportion of oil to total soap to vary the consistency of the grease in the usual well known manner. The invention therefore involves the use of a larger proportion of basic barium soap when the viscosity of the oil is low, and increasing the proportion of normal soap as the viscosity of the oil increases. This variation according to this invention may be measured on the basis of employment of about 75% to 100% of basic soap, with the remainder normal soap, when using a Western asphaltic or naphthenic type oil having a viscosity of 200 seconds Saybolt Universal at 100° F., and a gravity below about 25° A. P. I.; whereas about 40% to 55% or 60% of basic soap should be employed with the normal soap when using a heavier Western oil having a viscosity of 500 seconds Saybolt Universal at 100° F. and a gravity below about 23.5° A. P. I. When using a still heavier Western oil with a viscosity of about 1000 seconds at 100° F. and a gravity below about 22.5° A. P. I. the ratio of basic soap to normal soap in the total soap content may be from 25% to 40% and when using an extra heavy Western oil with a viscosity of about 110 at 210° F. and with a gravity below about 21.0° A. P. I. the ratio of basic soap to normal soap in the total soap content may be below 25% and extend even as low as 0%.

In practicing this invention, we have found that the grease making procedure may be made moderately simple by employing calculated quantities of soap-making materials, and proceeding with reasonable regulation of all operations. In general, these procedures are as follows:

The fatty materials and the hydrated barium hydroxide are introduced into a grease making kettle fitted with adequate mechanical means for agitation of the kettle contents, and adapted to be heated by any convenient means, such as steam coils, steam jackets, electrical elements, fire, or the like. A suitable fat, or mixture of fats, or of fats and fatty oils such as tallow, tallow and horse fat, tallow and cottonseed oil, tallow and lard oil or the like, is introduced into the kettle together with a calculated amount of hydrated barium hydroxide. Thus, 352 parts of prime tallow are introduced into a kettle and mixed at room temperature with 341 parts of commercial hydrated barium hydroxide, consisting of approximately 54% of available barium hydroxide and 46% of water of crystallization and impurities. This mixture is heated for 30 to 60 minutes as by means of steam introduced into the kettle jacket at approximately 100 pounds per square inch pressure. During this time, the temperature will have increased to somewhat above the boiling point of water, e. g. 214° F., hydrolysis of the soap stock will have been substantially completed, and a large proportion of the water of crystallization of the barium hydroxide will have been removed. This water constitutes somewhat more than 20% of the saponification charge, and as a part of it is liberated and eliminated before actual soap formation takes place, it causes foaming. To form the normal barium soap, BaR₂, and to overcome the foaming of the batch requires approximately 15 minutes additional time, during which no external heat is applied to the kettle.

After formation of the normal barium soap, and the elimination of sufficient water to permit the foam to subside, heating is begun again as by means of steam at from 100 to 125 pounds per square inch, and the temperature is gradually

raised, during which period introduction of a portion of the total mineral oil required in the finished grease is begun. The rate of addition of this oil is adjusted so that the grease is not softened to such an extent that foaming occurs, nor, on the other hand, does excessive hardening of the soap take place, this operation requiring approximately 8 hours, during which time the amount of oil added approximates about one-third of the weight of the completed grease. During this time the temperature of the kettle contents will have risen, in a particular case, to about 340° F., and the exothermic effect accompanying the formation of basic barium soap from the normal barium soap and the remaining free barium hydroxide proceeds so vigorously that outside heating is discontinued. By this time, the free barium hydroxide content has been reduced to less than 1.75% under average conditions. The heat of reaction raises the temperature from approximately 340° F. up to 360° F. to 375° F., and by maintaining the temperature at, but preferably not exceeding the latter temperature, for from one to two hours the free barium hydroxide content is lowered to about 0.50% or lower, but preferably to not less than 0.2%. During this period further small increments of mineral oil may be added, if necessary, to control the temperature. The remainder of the oil is then added, with constant stirring as rapidly as it will be accepted by the kettle contents, and at a rate fast enough to avoid hardening of the soap and adhesion thereof to the kettle walls. It is important to avoid such hardening and adhesion inasmuch as this results in excessive dehydration. The addition of a part of the remainder of the oil results in the lowering of the temperature to around 300° F. or it may be allowed to drop to a lower figure, for example to 275° F. without any particularly objectionable action. When sufficient oil has been added to the grease at these temperatures to yield the desired soap content (say 20%, 25%, or 30%), heating is resumed and the temperature is raised to around 300° F. to 330° F. and maintained for a time until the free alkaline content is reduced to the desired range of below 0.15%, and preferably to about 0.05%. Having attained this very slight degree of alkalinity, the temperature of the grease is adjusted to about 330° F., and the grease drawn off into pans for cooling. If for any reason it becomes difficult in the allotted time to lower the free alkali content to the desired figure of approximately 0.05% it will ordinarily be permissible to add a calculated amount of free fatty acid so as to adjust the alkalinity during a short additional period of heating and agitation; but this practice is not to be preferred.

When the grease has been thoroughly cooled, which ordinarily will take as much as 70 to 100 hours, it may be returned to the kettle and homogenized by agitation with a stirring device, or by circulation from the bottom to the top of the kettle by means of a gear pump, or by any other suitable means, such as a milling machine, or grease worker, in order to destroy any granular or gel-like structure which may have been developed. Thus, if about 10% of cottonseed oil is used in a saponification charge, as above indicated as feasible, there is some tendency to gel, whereas if the grease is overheated there is sometimes a slight tendency toward a granular structure, and the homogenizing operation eliminates both of these conditions. A grease produced by the above described procedure, employing prime

tallow alone as the soap stock and using a Western oil of 500 seconds Saybolt Universal viscosity at 100° F. and possessing a 5 color as determined on the N. P. A. scale, with materials calculated to yield a final soap content of 21.05%, possessed a Ubbelohde melting point of 390° F., a water content of 0.09% and a calculated glycerin content of 1.48%. Another grease produced by similar procedure to yield a soap content of 21.4% possessed a melting point above 350° F., a water content of 0.10% and a glycerin content of 1.4%. Obviously the consistency of the grease may be varied by increasing or decreasing the proportion of soap or by increasing or decreasing the viscosity of the mineral oil employed or by varying the nature of the fatty materials used, as is well known to the commercial grease maker.

While specific temperature ranges have been indicated for certain stages of various operations, it is to be understood that a considerable amount of variation in temperature may occur within the general limits outlined. In explanation of this statement, it may be said that in the initial heating operation and saponification step, before addition of any oil, which step is accompanied by substantial dehydration, the temperature is maintained at that value which insures the required degree of dehydration, coincident with the production of normal barium soap. This temperature will be slightly above the boiling point of the water. The next heating stage requires further application of steam or other heating medium to the kettle to cause a gradual rise in temperature up to about 300° F., during which stage the introduction of the oil is commenced, the temperature rise naturally being correspondingly gradual. After the formation of basic barium soap commences by reason of the reaction between the normal soap and the free barium hydroxide, the exothermic reaction will cause the temperature to rise with more or less rapidity and to a greater or lesser degree, according to the amount of oil that is added during that interval, and to the proportion of free barium hydroxide available to react with the normal soap. Thus, the temperature may be 340° F., or it may be allowed to rise to 360° F. to 375° F., although the higher temperatures should be avoided, and no extraneous heat should be added at this stage. As the addition of the remainder of the lubricating oil proceeds and the temperature is allowed to drop, such temperature drops may be limited to about 300° F. or it may be allowed to fall to as low as 275° F. to 250° F., followed by a further elevation in temperature up to 300° F. to 330° F., to complete the final stage of formation of basic barium soap and consequent reduction of the alkalinity to the desired minimum approximating 0.05% of barium hydroxide. Whatever this final heating temperature, the temperature at the draw-off stage preferably should be close to 330° F. for best results with a product which contains the preponderantly basic soap desired. In any event, it will be observed that in general, from about the time that the formation of basic barium soap actually begins and the addition of the major quantities of oil is commenced, the temperature range will lie between about 300° F. and 350° F., and for all practical purposes this range should be set as the operating range after the initial stages of hydrolysis, dehydration and oil introduction have been concluded. As has been stated, the rate of oil addition is governed by the soap texture so that there will be neither foaming nor excessive hardening and dehydration of the

soap, the oil being added as rapidly as the soap will take it up and maintain these conditions of consistency.

Thus the composition of this invention is a petroleum grease prepared with barium soap. In common with sodium and calcium soap greases, the amount of soap should be limited because if too much soap is used the grease-like characteristics will be lost. It is preferable therefore, to use minor quantities of soap and major quantities of oil, these terms being used merely to imply that the quantity of soap is limited in such manner that the grease-like character is not destroyed. Thus, for a hard grease for some lubricating uses, the soap content might be increased to somewhat more than one-half of the combined soap and oil of the grease composition.

It is to be understood that the above disclosures are illustrative of the broader invention here disclosed and are not to be taken as limiting except as required by the prior art, inasmuch as a number of variations outside of those indicated will undoubtedly be apparent to those skilled in the art.

We claim:

1. A method for the production of barium soap grease comprising heating together fatty materials and barium hydroxide to hydrolyze the fatty materials and substantially dehydrate the same, raising the temperature of the mixture into a range in excess of 300° F. while adding mineral oil having good solvent properties for the soap, maintaining the temperature between a range of about 300° F. and 375° F. over a period of time to reduce the free barium hydroxide content to around one-half of one percent and simultaneously convert a part of the normal barium soap to basic barium soap, the barium hydroxide being employed in an amount necessary to yield in the final product a desired large proportion of basic barium soap in addition to normal barium soap, supplying additional oil to complete the grease, and withdrawing the grease, the total oil used being in substantial quantity sufficient to produce grease consistency.

2. A method of making barium soap grease by first preparing a barium soap, essentially normal barium soap, then raising the temperature of the mass accompanied by the addition of petroleum oil having good solvent power for the basic barium soap resulting, the soap containing free barium hydroxide sufficient to eventually produce a large proportion of basic barium soap, and continuing the heating for a time sufficient and at temperatures sufficient to cause a reaction between normal barium soap and substantially all of the free barium hydroxide to produce the basic barium soap, and introducing petroleum oil and establishing a temperature to obtain grease consistency, the oil being a naphthenic or asphalt base lubricating oil and the soap making materials being employed to yield a proportion of basic soap to total soap varying roughly from 75 to 99 percent with oils having a viscosity of 200 seconds Saybolt Universal at 100° F. toward a range of 25 to 40 percent basic soap for oils having a viscosity of 100 seconds Saybolt Universal at 100° F.

3. A method for manufacturing barium soap grease comprising producing normal barium soap and heating the soap mass, together with the addition of mineral lubricating oil having good solvent properties for the barium soaps with sufficient barium hydroxide only to cause barium hydroxide to react with a desired large proportion of the normal barium soap to produce basic

barium soap and without the addition of further fatty materials, and adding mineral oil in sufficient quantity and at temperatures to produce the desired grease consistency.

4. A method according to claim 3 in which the soap conversion temperature range is between about 300° F. and 375° F. and the grease forming temperature ranges down to about 300° F.

5. A method according to claim 3 in which the soap conversion temperature range is limited to a maximum of about 375° F. and the grease forming temperature ranges down to around 300° F.

6. A method for the manufacture of barium soap grease comprising an initial stage of heating fatty materials and barium hydroxide to hydrolyze the fatty materials and produce normal barium soap and partially dehydrate the mass, a second grease making stage comprising raising the temperature of the soap mass to about 300° F. while adding successive quantities of mineral lubricating oil having good solvent properties for barium soaps, and subsequent grease making stages comprising further heating to elevated temperatures to cause reaction of substantially all of the free barium hydroxide with normal barium soap to yield basic barium soap, the barium hydroxide being employed in calculated amount to yield a final product containing a desired large proportion of basic barium soap with respect to total soap, the soap conversion being followed by the addition of further quantities of oil having good solvent properties for barium soaps in conjunction with temperature reduction, said subsequent grease making stages being carried on within a range approximately between 300° F. and 375° F., the total used oil being in substantial quantity sufficient to produce grease consistency.

7. A method for the production of barium soap grease comprising heating fatty materials and barium hydroxide to hydrolyze the fatty materials and partially dehydrate the mass, barium hydroxide being employed in an amount to yield in the final product a barium soap which contains a large proportion of basic barium soap, adding a portion of the necessary amount of mineral oil required to produce the grease while raising the temperature to approach 300° F., continuing the heating to a temperature approaching 340° F. to reduce the barium hydroxide content, continuing the heating of the mass in a range approximating 300° F. to 375° F. to reduce the barium hydroxide content to about 0.5% whereby a large proportion of the soap is converted to basic barium soap adding mineral oil at temperatures to obtain grease consistency, and drawing the grease.

8. A method for the production of barium soap lubricating grease comprising heating fatty materials and barium hydroxide to hydrolyze the fatty materials and partially dehydrate the mass, adding a portion of the necessary amount of mineral oil required to produce the grease, raising the temperature to approach 340° F. to reduce the barium hydroxide content, the amount of barium hydroxide employed being such as to yield in the final product a barium soap containing a substantial proportion of basic barium soap, maintaining the mass at an elevated temperature not exceeding about 375° F., whereby the barium hydroxide content is further reduced to about 0.5% and a substantial proportion of the normal soap is converted into basic barium soap, adding the remainder of the oil and cooling the mass, establishing the temperature range above about

275° F., completing the grease formation, and drawing the finished grease.

9. A method for the production of barium soap grease comprising heating fatty materials and barium hydroxide to hydrolyze the fatty materials and partially dehydrate the mass, the barium hydroxide being employed in an amount to yield in the final product a barium soap which is preponderantly basic barium soap, adding a portion of the necessary amount of mineral oil required to produce the grease, raising the temperature to approach 300° F. continuing the heating to a temperature approaching 375° while the barium hydroxide content is being reduced and a preponderant proportion of the soap is converted to basic barium soap, continuing the addition of mineral oil while the barium hydroxide content is further reduced and drawing the grease.

10. A method for the production of barium soap grease comprising heating fatty materials, and barium hydroxide to hydrolyze the fatty materials and partially dehydrate the mass, barium hydroxide being employed in an amount to yield in the final product a barium soap which is preponderantly basic barium soap, adding a portion of the necessary amount of mineral oil required to produce the grease while raising the temperature to approach 340° F. to reduce the barium hydroxide content, continuing the heating while the temperature approaches 375° F. and the barium hydroxide content is further reduced to about 0.5 and a preponderant proportion of the soap is converted to basic barium soap, cooling the grease by the gradual addition of the remainder of the oil to a temperature around 300° F. heating the grease to about 330° F. while the barium hydroxide content is reduced to below about 0.15% and drawing the grease.

11. A method according to claim 7 wherein the heating following the initial rise to around 340° F. to 375° F. is continued for a sufficient period of time to effect conversion of the large proportion of the soap to basic barium soap, solution of the soap in the oil, and substantial dehydration of the grease, the grease being drawn at approximately 330° F.

12. A method for the production of barium soap grease comprising heating fatty materials and barium hydroxide to hydrolyze the fatty materials and partially dehydrate the mass, the barium hydroxide being employed in an amount to yield in the final product a barium soap which contains a large proportion of basic barium soap, heating the mass to a temperature exceeding 300° F. while adding increments of mineral lubricating oil thereby reducing the free barium hydroxide and forming basic barium soap therewith, heating the soap and oil mixture in a range approximately between 340° F. and 375° F. to substantially complete the reaction between the normal barium soap and free barium hydroxide, and adding further quantities of said mineral lubricating oil with coincident temperature reduction of the mass, the total oil used being in substantial quantity sufficient to produce grease consistency.

13. A grease making method according to claim 12 wherein in connection with the addition of the further quantities of oil with a coincident temperature reduction, the temperature is reduced to around 300° F. and the mass is then raised to around 330° F. and drawn, the oil being a naphthenic or asphalt base lubricating oil and the soap making materials being employed to yield a proportion of basic soap to total

soap varying roughly from 75 to 99 percent with oils having a viscosity of 200 seconds Saybolt Universal at 100° F. toward a range of 25 to 40 percent basic soap for oils having a viscosity of 100 seconds Saybolt Universal at 100° F.

14. A method for making barium soap greases comprising combining a mixture of basic and normal barium soap with naphthenic base mineral lubricating oil in proportions to yield greases of lubricating consistency, the proportion of basic barium soap to the normal barium soap being decreased as the viscosity of the lubricating oil is increased so that the proportion of basic soap to total soap varies roughly from a range of 75 to 99 percent of basic soap toward a range of 25 to 40 percent of basic soap as the viscosity of the oil varies from about 200 seconds Saybolt Universal at 100° F. toward 1000 seconds Saybolt Universal at 100° F., the total oil used being in substantial quantity to produce grease consistency.

15. A method according to claim 14 wherein the grease making operation is carried on at temperatures in excess of about 300° F.

16. A method according to claim 14 wherein the proportion of basic soap is varied from between about 75% and 100% with an oil having a viscosity of 200 seconds Saybolt Universal at 100° F. to between about 25% and 0% of basic soap where the oil has a viscosity of about 110 seconds Saybolt Universal at 210° F.

17. Barium soap greases comprising mixtures of normal and basic barium soaps combined with mineral lubricating oils having good solvent power for the soaps, the proportion of basic barium soap to normal barium soap in the greases varying with respect to viscosity and gravity of the lubricating oil approximately on the following basis: about 75 per cent of basic soap with a Western oil having a viscosity in the range of about 200 seconds Saybolt Universal at 100° F. and a gravity below about 25° A. P. I.; 40% to 60% of basic soap with a Western lubricating oil having a viscosity in the range of about 500 seconds Saybolt Universal at 100° F. and a gravity below about 23.5° A. P. I.; 25% to 40% of basic barium soap with a Western lubricating oil having a viscosity in the range of about 1000 seconds Saybolt Universal at 100° F. and a gravity below about 22.5° A. P. I.; and basic barium soap in amounts less than about 25% with a Western lubricating oil having a viscosity in the range of about 110 seconds at 210° F. and a gravity below about 21° A. P. I.

18. Barium soap greases comprising mixtures of normal and basic barium soaps combined with mineral lubricating oils having good solvent power for the soaps, the proportion of basic barium soap to normal barium soap with respect to viscosity and gravity of the lubricating oil being approximately on the following basis: between 40% and 60% of basic soap with a naphthenic lubricating oil having a viscosity in the range of about 500 seconds Saybolt Universal at 100° F. and a gravity below about 23.5° A. P. I.; between 25% and 40% of basic barium soap with a naphthenic lubricating oil having a viscosity in the range of about 1000 seconds Saybolt Universal at 100° F. and a gravity below about 22.5° A. P. I.; and basic barium soap in amount less than about 25% with a naphthenic lubricating oil having a viscosity in the range of 110 seconds at 210° F. and a gravity below about 21° A. P. I.

19. A barium soap grease comprising a mixture of normal and basic barium soaps containing between about 40% to 60% of basic soap with a

Western lubricating oil having a viscosity ranging around 500 seconds Saybolt Universal at 100° F. and a gravity below about 23.5° A. P. I.

20. A barium soap grease comprising a mixture of normal and basic barium soaps containing about 25% to 40% of basic barium soap and combined with a Western mineral lubricating oil having a viscosity in the order of about 1000 seconds Saybolt Universal at 100° F. and a gravity below about 22.5° A. P. I.

21. A barium soap grease according to claim 24 having a melting point above about 250° F.

22. A barium soap grease according to claim 17 having a melting point above about 250° F.

23. A method for the production of lubricating compositions comprising dissolving a minor proportion of a mixture of basic and normal barium soaps in a major proportion of a naphthenic base mineral lubricating oil, and varying the proportion of basic barium soap to normal barium soap roughly from 75 percent toward 25 percent as the viscosity of the oil varies from about 200 seconds Saybolt Universal at 100° F. toward 1000 seconds Saybolt Universal at 100° F.

24. A lubricating composition comprising a

major proportion of a naphthenic mineral lubricating oil and a minor proportion of a mixture of basic and normal barium soaps wherein the proportion of basic soap to total soap is roughly of the order of 75% of basic soap where the viscosity of the oil is about 200 seconds Saybolt Universal at 100° F., and roughly of the order of 25% basic soap where the viscosity of the oil is about 1000 seconds Saybolt Universal at 100° F.

25. A lubricating composition according to claim 24 having a water content approximating 0.1%.

26. A method according to claim 1 wherein the grease is cooled during the supplying of the additional oil to a temperature within a range of about 275° to 300° F., then raising the temperature to around 300° F. to 330° F., and completing and withdrawing the grease.

27. A lubricating composition according to claim 17 having a water content approximating 0.1%.

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