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GREASE

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My invention relates to greases and more particularly to an improved grease of low soap content and high melting point.

A grease comprises an admixture of soap and mineral oil, the soap acting to thicken the oil to give it a solid or semi-solid consistency, adapting it for use as a lubricant for surfaces on which hydrocarbon oils would be too fluid to be used.

Heretofore, high melting point greases have required the use of comparatively large percentages of soap.

One object of my invention is to provide a lubricating grease which has a comparatively low soap content but possesses a comparatively high melting point.

Another object of my invention is to produce a transparent, smooth grease having a high hydrocarbon oil content.

Other and further objects of my invention will appear from the following description.

In general, my invention contemplates the confection of a sodium soap grease having a soap content from 2 to 10 percent and having a high melting point.

My grease can best be understood by giving an example of the confection of one grease embodying my invention. It is to be understood that this example is by way of illustration and not by way of limitation.

For the saponifiable material of my grease, I employ hydrogenated oils, glycerides of fatty acids, fatty acids, animal or vegetable fats and, if desired, rosin. The hydrogenated oils, vegetable and animal oils, fatty acids, fats or glycerides should have a melting point (titer method) of from 40° to 55° C. Any proportion of the various animal or vegetable fats, fatty acids, hydrogenated animal or vegetable oils may be employed to make up the saponifiable material. The saponifiable material may comprise not more than 30 percent of rosin. The rosin makes the grease more fluid at high temperatures and appears to be an aid in dehydration of finished grease.

This saponifiable material which may comprise from 2 to 10 percent by weight of the finished grease, is charged into a grease kettle with about 5 percent of the hydrocarbon oil which is to be used in the manufacture of the grease. For the hydrocarbon oil I use an overhead stock having a viscosity falling between 90 seconds at 100° F. Saybolt Universal to 160 seconds at 210° F. Saybolt Universal. The mineral oil may be comprised of a portion of a residual oil which in no case should be over 30 percent of the total quantity of the hydrocarbon oil used and in every case the hydrocarbon oil base should have a viscosity falling between the range just mentioned.

The hydrocarbon oil and the saponifiable material are heated to fluidity and agitated, the heating being carried on to a temperature of about 150° F., which is well below the fire point of the hydrocarbon oil being used. After all the fats and oils comprising the saponifiable material are melted and the mass in the kettle is a homogeneous fluid, the saponifiable material is saponified with sodium hydroxide. I find it convenient to employ a solution comprising one third by weight of sodium hydroxide and two thirds by weight of water. The sodium hydroxide added is about 20 percent more than is theoretically necessary to saponify the saponifiable material. The heating and agitating are continued until the temperature is raised to about 250° F.

The greatest part of the water is boiled off, since the mass is heated to a point above the boiling point of water. When a temperature of 250° F. is reached, enough of the saponifiable material has been saponified to render the mass thick and difficult to agitate. I then add additional hydrocarbon oil base in order to soften the saponified material to the end that the agitation may be continued. In most cases, an additional 5 percent of the total weight of the hydrocarbon oil in the finished grease is sufficient to soften the soap and render it fluid.

The heating is so controlled that the temperature of 250° F. will not be reached for about 30 minutes. After the additional mass of oil has been added, the heating is continued until the temperature reaches 350° F. The mass is then held at this temperature for a period varying between 5 and 15 minutes, depending upon the amount of saponifiable material. The practice of holding the mass at this temperature is to insure a substantially complete saponification and to enable thorough dehydration. Due to emulsification, a certain quantity of moisture can never be removed by simply heating, and it is desirable that a certain amount of moisture be present in my finished grease. This appears to be necessary. At this point I add an amount of an aluminum soap to the mass. The amount of aluminum soap added is between 5 and 6 percent by weight of the saponifiable material employed in the particular grease being made. The addition of aluminum soap is always accompanied by the release of moisture. It appears that this small quantity of aluminum soap aids in dehydrating the mass and, at the same time, imparts additional stringiness and toughness to the finished

grease. My grease can be made without the addition of aluminum soap but a longer period must be allowed for dehydration. It is to be understood when I use the term "dehydration" throughout this specification that I do not mean complete dehydration, since I want from one hundredth to twenty-five hundredths percent of the finished grease by weight of moisture to remain in the grease when it is complete. This small quantity of moisture is necessary to obtain the desired results. The amount of moisture is critical and the results will not be produced if the moisture is completely removed or if the quantity of moisture remaining in the grease is too great.

After adding the aluminum soap, the heating is continued for another fifteen minutes in order to permit complete blending.

I am then ready to add the balance of the hydrocarbon oil which goes to make up the finished grease. This is added and the heating is so controlled that the batch is kept between 275° and 350° F. This temperature range is critical. If the grease is allowed to fall below this temperature, it will become so thick that it cannot be agitated. If the grease is heated too highly, the desired results are not obtained. After the hydrocarbon oil has been completely added and admixed, the grease is drawn into cooling pans. In practice, I prefer to use pans about five inches deep and about twenty inches wide, and about five feet long. If the amount of saponifiable material is comparatively small, that is, if a softer grease is desired, the pans may be filled substantially to the brim. If the amount of saponifiable material is higher and a harder grease is being made, the pans are filled to a thickness of about three inches. The cooling is then carefully controlled so that its temperature will drop substantially 100° in about ten hours. The temperature control is obtained by controlling the temperature of the room in which the grease is cooling. If the grease is allowed to cool too rapidly, a crusty and grainy grease is obtained, which bleeds hydrocarbon oil. If the grease is permitted to cool too slowly, a tough, fibrous, non-transparent grease is obtained. The rate of cooling varies depending upon the amount and kind of saponifiable material present. This can be readily determined from practice, as the rate of cooling is critical and should be conducted at such a speed that neither a crusty nor grainy grease, nor a tough, non-transparent grease is obtained. My finished grease is transparent and, if it is allowed to cool slowly, at a rate sufficiently rapid so as to remain transparent, the proper rate of cooling is being used.

After the grease has reached room temperature, the pans will contain cakes of transparent grease which is rather tough and fibrous and is covered by a thin layer of crusty, grainy grease. This crusty, grainy grease is caused by the fact that the surface has cooled too rapidly. The crusts are scraped from the pans and the cakes of grease removed. These are then broken up by milling, and forced by means of a rotary, positive displacement pump through one or a number of screens varying from 40 mesh to 120 mesh. The purpose of milling the grease and forcing it through the screens is to break up the fibrous structure and to give a smooth, short grease. The finished grease as it comes from the screens is transparent to such an extent that ordinary print can be read through a layer of grease from 1 to 4 inches in thickness. The finished grease will have a sodium soap content from 2 to 10 percent. It will have a moisture content (water) of from one hundredth to twenty-five hundredths percent. It will have a free sodium hydroxide content of less than one tenth of one percent. It will have a free glycerine content of not more than one half of one percent. The balance of the grease will be the hydrocarbon oil employed. All percentages given above are by weight based on the finished grease.

The grease, besides being transparent and of a short, smooth consistency and of low soap content and high hydrocarbon oil content, will have an unusually high melting point for such a comparatively small soap content. The melting point determined by the Ubbelohde drop method will be between 250° and 350° F. The penetration number (A. S. T. M.) of a worked grease will be between 240 and 400. A particular example of a grease according to my invention, which is adapted to be used as a cup grease, has a sodium soap content of only 6 percent and a melting point of 300° F., and a penetration number of 275.

It will be observed that I have accomplished the objects of my invention. I have provided a high melting point grease having a high hydrocarbon oil content and a low soap content, which grease is transparent in nature and has a short, smooth texture.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. A transparent, smooth textured grease having a sodium soap content between two and ten percent by weight, a water content from one hundredth to twenty-five hundredths percent by weight, a free alkali content from one hundredth to ten hundredths percent by weight, a glycerine content from zero to five tenths percent by weight, and a hydrocarbon oil content from ninety-seven and ninety-eight hundredths to eighty-nine and fifteen hundredths percent by weight, said grease having a melting point as determined by the Ubbelohde drop method from 250° to 350° F. and a penetration number from 240 to 400, said grease being sufficiently transparent that ordinary print can be read through a layer of grease at least one inch in thickness.

2. A grease comprising from two to ten percent by weight of a sodium soap, from one hundredth to twenty-five hundredths percent by weight of water, from one hundredth to ten hundredths percent by weight of free sodium hydroxide, from zero to five tenths percent by weight of glycerine, from twelve hundredths to six tenths percent by weight of an aluminum soap, from ninety-seven and eighty-six hundredths to eighty-eight and fifty-five hundredths percent by weight of a hydrocarbon oil, said grease having a Ubbelohde drop point of from 250° to 350° F. and a penetration number of from 240 to 400, said grease being sufficiently transparent so that ordinary print can be read through a layer one

inch in thickness and having a short, smooth texture.

3. A method of making a grease which comprises the steps of saponifying animal or vegetable fats having a titer melting point between 40° to 55° C. by means of sodium hydroxide, adding the hydrocarbon oil to be thickened to the saponified mass while heating the mixture to a temperature between 275° F. and 350° F., the hydrocarbon oil being added in such amount that the finished grease will have a soap content between 2 and 10% by weight, said saponifying step being such that the finished grease will have a free alkali content between .01 and .10 percent by weight, and then cooling the thus thickened hydrocarbon oil at such a rate that a high melting point grease is obtained sufficiently transparent so that ordinary print may be read through a layer at least one inch in thickness.

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