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ANHYDROUS LUBRICANT

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This invention relates particularly to greases which may be used as lubricants in various connections but particularly adapted to the waterproofing and lubricating of cordage, such as hemp rope, whose life is thereby increased.

The principal object of the invention is to produce a cordage lubricant which will be stable in use and from which the soap will not separate. Primarily, this object is attained by employing any fat or fatty agent, such as a fatty acid or a material containing fatty acid, which assists an unsaponified fat also contained in the grease in holding the soap in solution in the lubricating oil or other petroleum fraction employed, the two fats being of different character.

Briefly, the invention may be stated as residing in a lubricating composition containing a large proportion of petroleum products, a considerable proportion of calcium soap of a suitable fat such as cottonseed oil soap, a considerable proportion of an unsaponified fat adapted for holding the soap in solution, such as cottonseed oil, and a relatively small proportion of another unsaponified fatty material of different character adapted to assist the unsaponified fat in holding the soap in solution in the petroleum fractions and prevent separation or precipitation of said soap. The invention resides particularly in such a lubricant which is both anhydrous and non-emulsifying, wherein the unsaponified fat is cottonseed oil, the soap is a calcium soap of a fatty acid, and the fatty material is degras.

The invention resides further in such a composition wherein the petroleum fractions amount to approximately half of the grease and consist of about equal proportions of petrolatum (or paraffin wax) and a mineral lubricating oil of a viscosity adapted to produce a desired grease consistency. The invention further resides in such a lubricant wherein the mineral oil, the petrolatum and the cottonseed oil (or equivalent fatty oil) are present in roughly equal proportions and the degras or fatty acid material of similar characteristics is present in the order of a few percent only.

One suitable formula for a grease according to this invention is as follows:

	Per cent by weight
Calcium soap of cottonseed oil or oleic acid	15
Cottonseed oil having preferably a maximum of 2% fatty acid	31
Petrolatum	25
Western lubricating oil, 100 seconds Saybolt Universal viscosity at 100° F	25
Degras having a small proportion of fatty acid, e. g. around 15% fatty acid	4

In another instance the product contained the following compositions:

	Per cent by weight
Calcium soap of cottonseed oil	19
Cottonseed oil as above	27
Petrolatum	25
Western lubricating oil, 100 seconds Saybolt Universal viscosity at 100° F	25
Degras as above	4

In both cases the product was a light amber-color semi-solid grease well adapted to lubrication of rope and other cordage.

While the materials above designated are much preferred, it is nevertheless possible to produce reasonably satisfactory products by the substitution of lard oil or an equivalent liquid fat for the cottonseed oil. To increase the waterproofing qualities by imparting increased penetration properties thereto, a portion of the unsaponified cottonseed oil may be replaced by fatty acids such as tallow fatty acids, or other animal fatty acids or vegetable fatty acids. Preferably, but not necessarily, these should be of the solid type such as palmitic and stearic acids inasmuch as the rancidity characteristics of the liquid fatty acids are thereby avoided. Thus a commercial fatty acid consisting chiefly of stearic and palmitic acids with some oleic acid is satisfactory. In case of employment of these fatty acids a good proportion is 12% of the total composition, and if they are employed for the stated purpose of increasing waterproofing characteristics, upward of this amount would be required and greater amounts up to total replacement of the unsaponified cottonseed oil may be used. However, for purposes of economy, and especially where the lubricating qualities primarily are desired, such fatty acid substitution will not be made.

As to the function of the degras, it is not clear whether it is the fat of the degras or the small quantity of the fatty acids ordinarily contained in the degras that serves to impart necessary soap holding characteristics for assisting the other unsaponified fat (cottonseed oil) in performing its soap holding function. In any event, the degras has not yet been found to have any wholly satisfactory substitute in oleic acid or equivalent saturated or unsaturated fatty acids. However, in instances where the high soap holding functions of the degras is not essential or highly desirable it is possible to substitute solid fatty acids such as above mentioned including stearic and palmitic acids, or possibly even oleic acid where its characteristics of developing ran-

cidity and bad color are not serious objections. Nevertheless for a desirable commercial product having high capacity to retain the soap the degras has no equal.

The degras here employed is a commercial degras at present on the market which is an oxidized fish oil produced by oxidizing in contact with animal hides, and is in general solid at normal room temperatures.

In preparing a substantially anhydrous calcium soap grease according to this invention, a quantity of hydrated lime is added to the cottonseed oil, petrolatum and mineral oil mixture in amount calculated to yield 15% or 20% of calcium soap and the desired amount of unsaponified cottonseed oil as above indicated. The mixture is heated until the lime has been exhausted in the saponification step, this temperature eventually being carried to 300° F. to effect both saponification and substantially complete dehydration. At this stage the degras is added with agitation, the mixture generally cooled at about 100° F. over a period of several hours and finally drawn into containers at 100° F. The water content ordinarily is thus reduced to less than 1%. However, depending upon the use, the water content might be slightly greater, say 2 or 3%. The significance is to avoid foaming under the conditions of application and not to change the consistency of the material at the temperature under which the product is held during use.

As a specific example for the preparation of a grease of this invention, the following procedure was employed in producing the second product whose composition is given above.

A batch of about 4,000 lbs. was prepared by mixing in a steam kettle 1,780 lbs. cottonseed oil, 1,000 lbs. of Western mineral lubricating oil of 100 seconds Saybolt Universal at 100° F., 1,000 lbs. of amber petrolatum, about 80 lbs. of hydrated lime, about 120 lbs. of water. Steam was turned into the jacket of the kettle and the temperature was raised slowly to approximately 220° F. at which it was held for a period of a number of hours until dehydration was completed. The temperature was then raised to 300° F. and held for a few hours or until saponification was completed. After all of the lime had been consumed in the formation of calcium soap of the cottonseed oil, 160 lbs. of commercial degras was added and mixed with agitation, and while maintaining agitation, the temperature was allowed to drop over a period of about 15 hours to about 100° F. whereupon the product was drawn off and packaged. The water was added to the batch to facilitate saponification, but after the dehydration procedure was finished a mere trace only of water remained.

A grease of the above character, although a semi-solid at ordinary temperatures (i. e. 60° F. to 90° F.) is nevertheless fluid at about 150° F.–175° F. to which it is heated for application to the goods, and may be held at this temperature over an extended period of time without exhibiting any tendency to separate into phases. This demonstrates the effectiveness of the degras as a holding agent to prevent separation of calcium soap. Although the cottonseed oil is in itself a soap solvent and is fairly satisfactory in this respect, it is nevertheless not adequate for all purposes and the degras compound is therefore preferred as an additive. The quantity of cottonseed oil would ordinarily not fall below about 20%.

While the proportions above indicated are preferred, the percentage of the material may nevertheless be modified by increase or decrease within reasonable limits depending upon the fluidity desired at the temperature at which the product is to be used. For example, a heavier lubricating oil may be employed or the quantity of petrolatum may be increased if less fluidity is desired or lighter mineral oil, or a smaller quantity of petrolatum may be used for greater fluidity, or paraffin wax may be substituted for all or part of the petrolatum. In some connections it will be possible either to eliminate the petrolatum or to eliminate the mineral oil according to the requirements. Likewise, the percentage of soap and the percentage of cottonseed oil may be varied within reasonable limits according to the consistency of the grease desired. However, a soap content mucn below 10% would probably too greatly reduce the lubricating properties of the grease and a content much above 25% would probably render the treated rope too sticky. Inasmuch as a considerable quantity of unsaponified liquid fat or fatty acids must be retained to prevent separation of soap from the mineral oil, the soap and petrolatum content, as well as the viscosity of the oil, must be gauged to produce a commercially acceptable product. Otherwise the limits of variation of constituents is governed by the necessity of preventing soap separation.

As to the percentage of degras, about 4% in general appears to be a practical optimum. While a somewhat smaller percentage may be employed, material reduction does not sufficiently assist the holding functions of the cottonseed oil, whereas a very great increase over 4% does not greatly further increase the holding function and therefore does not justify the increased expense. Therefore, for most practical purposes, general percentages represented by the two specific examples above given, are representative of what is now considered as being the best commercial procedure. As a substitute for the calcium soap of cottonseed oil, an aluminum or barium soap of cottonseed oil may be employed which are adapted to the production of anhydrous and non-emulsifying greases.

Although these greases have been found to be specially useful for the waterproofing and lubricating of cordage, they may of course be used in many other connections, and while preferred proportions have been given as illustrative of the invention, it is nevertheless to be understood that various modifications may be made by those skilled in the art and yet afford the desired functions and the benefits above described.

I claim:

1. An anhydrous lubricant comprising roughly 50% of petroleum lubricating fractions at least about as heavy as light lubricating oils, a quantity of unsaponified liquid fat approximating one-fourth of the composition, between about 10% and 25% of a soap of a liquid fat producing a non-emulsifying grease, and a small proportion in the order of a few percent of a normally solid fatty acid material to insure retention of the soap.

2. A lubricant according to claim 1 wherein the fatty acid material is degras.

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