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BLOCK GREASES

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6 Claims. (Cl. 252—42)

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This invention is directed to improved block grease compositions possessed of greater homogeneity, lower weight loss in serivce, and greater structural stability under service conditions than those heretofore known.

Block greases may be characterized generally as solid high melting point greases, usually essentially anhydrous, produced in block or cake form, and designed to lubricate by the rubbing of the block of grease upon one or more of the moving parts to be lubricated.

Prior art block greases are exemplified hereinafter by two greases, designated as greases A and B. The formulation of these greases starts with whole fats, i. e. esters of fatty acids, which are saponified with an alkali (caustic soda in the examples), to arrive at alkali metal soaps, (soda soaps in the examples), and free glycerine in the resulting grease. These greases are formulated to operate at temperatures of 250° F. and 350° F. respectively. Under such service conditions, these greases tend to separate free oil, while the desired performance should be accomplished by feeding only the softened grease. Many such greases tend to harden and/or to carbonize upon the feeding surface. This hardening results in a film which can result in preventing further feed of the grease from the block to the surface to be lubricated.

Glycerine is generally regarded as a "coupling agent" or promoter of structural stability in greases of this sort. However, in the manufacture of this type of grease in which glycerides of the fats are used, and /or glycerine is incorporated in the formulation at the temperatures (400°–500° F.) which are required for the solution of the soap in the oil, the glycerine decomposes and/or polymerizes—a reaction that results in evolution of volatile products and tends to destroy the homogenous and cohesive structure which is considered desirable in this type of grease.

A grease of this type, made from a soda soap of a glyceride, will tend to develop a fibrous structure at the feeding surface when operated in the range of 200–250° F. which in turn results in excessive consumption, unless a soap of multivalent metal is incorporated in sufficient quantity to prevent the development of the fibrous structure referred to above. This same effect can be accomplished by the use of monohydroxy high molecular weight alcohol, as will be shown later.

The points heretofore made are exemplified in Table I, wherein greases A and B are presently commercial block greases, grease C is a grease

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formulated from fatty acids only, containing almost no glycerine, and grease D is substantially the same grease as is C, except that it contains added glycerine. (It should be noted that grease C is not an operable commercial grease, since it cannot hold structure even under the mild conditions of storage. The soap and oil separate and the product becomes crumbly. Grease D would be an operable grease except for the drawbacks resulting from the presence of glycerine.) In the tables, the first portion shows formulation of the grease, the second shows performance tests.

Table I

	Grease			
	A	B	C	D
Formulation				
Hydrogenated Resin Acids			2.59	2.56
Myristic Acid			6.22	6.15
Hydrogenated fish oil acids			6.22	6.15
Hydrogenated fish oil glycerides	12.5	22.5	0.5	0.5
Tallow	12.5	5.0		
50% Na Sulphonate			2.08	2.05
Glycerine		0.55		1.43
200" Paraffin Oil			78.70	77.50
Barium Hydrate		1.55		
Caustic Soda	4.75	5.0	2.69	2.66
180" Paraffin Oil	60.75	65.45		
Lime base grease (°5 consistency)	9.50			
Oxidation Inhibitor			1.00	1.00
Performance				
Penetration—Unworked Fresh cut surface	59	46	68	47
Penetration, on running surface	39	47	63	35
Change of Running Surface	(1)	(2)	(2)	(3)
Temperature of test, °F.	220	220	220	220
Duration of Test, hours	96	96	48	48
Loss, grams/hour	.057	.047	.194	.079

[1] Glazed hardened.
[2] Darkens.
[3] Slight glaze hardens.

Particularly to be noted is the glazing and hardening of commercial grease A, the similar glazing and hardening of glycerine containing grease D, and the high loss, due to structural instability, of grease C. Grease B, designed for temperatures of operation well above the test, was not perceptibly affected. If the test had been conducted at a temperature of 350° F. it would have shown glazing and hardening somewhat similar to grease A.

The objects of this invention may be attained by the manufacture of greases which are low in glycerine and which utilize as a coupling agent or stabilizing ingredient an alcohol of high molecular weight, such as cetyl or stearyl alcohol.

Indicative of the comparative ability of such a grease, Table II presents comparative data on grease Example I and greases C and D of Table I. The makeup of the tabular data is parallel to that used in Table I. To suppress extraneous variations, these three greases C, D and Example I, were compounded with strictly uniform procedure. For additional information, data on grease A is incorporated to save reference to Table I.

Table II

	Example I	Grease C	Grease D	Grease A
Formulation				
Hydrogenated Rosin Acids	2.5	2.59	2.56	
Myristic Acid	6.0	6.22	6.15	
Hydrogenated Fish Oil Acids	6.0	6.22	6.15	
Hydrogenated Fish Oil Glycerides	0.5	.50	.50	12.5
Tallow				12.5
50% Na Sulphonate	2.0	2.08	2.05	
Glycerine			1.43	
Stearyl Alcohol	4.0			
200" Pariffin Oil	75.4	78.70	77.50	
Caustic Soda	2.6	2.69	2.66	4.75
180"Paraffin Oil				60.75
Lime base grease #5				9.50
Oxidation Inhibitor	1.00	1.00	1.00	
Performance				
Penetration, Unworked Fresh Cut Surface	58	68	47	59
Penetration, on Running Surface	51	63	35	39
Change of Running Surface	(1)	(1)	(2)	(3)
Temperature of Test °F	220	220	220	220
Duration of test, hours	48	48	48	96
Loss grams/hour	.035	.194	.079	0.57

[1] Darkens.
[2] Slight glaze hardened.
[3] Glazed and hardened.

It will be noted from the above tabulation that the grease of Example I does not glaze on the feeding surface and that it has the lowest consumption while it still maintains adequate lubrication. The conventional grease, (grease A), had a higher loss figure, even though it formed a hardened, glazed surface face and thus was furnishing resistance to the feed of grease to the surface to be lubricated.

Other formulations along this general line are equally effective for the purpose indicated, as may be noted from Table III.

Table III

Example	2	3	4	5	6	7
Formulation						
Rosin Acids	5.0%	4.0	4.0	3.0	2.5	2.5
Myristic Acid	5.0%	7.0	8.5	6.0	6.0	6.0
Hydrofol Acid	10.0%	8.5	8.5	6.0	6.0	4.4
Hydrofol Glycerides		1.5		.75	0.5	0.5
Candellila Wax	4.0%					
Cetyl Alcohol (C. P.)		3.0				
Cetyl Alcohol (Com.)			3.0			
Stearyl Alcohol (Com.)				2.0	4.0	3.6
Marine Pitch						2.0
50% Na Sulphonate		2.0	2.0	2.0	1.5	2.0
60% Na Sulphonate	1.5%					
200" Paraffin Oil	70.0	69.6	69.4	76.75	76.45	75.8
Caustic Soda	3.3	3.4	3.6	2.5	2.5	2.65
Oxidation Inhibitor	1.00	1.00	1.00	1.00	0.55	0.55
Performance						
Penetration, unworked Freshly cut surface	65	37	36	42	47	45
On running surface	53	32	37	38	45	45
Change of running surface from original condition	(1)	(2)	(2)	(3)	(3)	(3)
Temperature of Test °F	220	220	220	220	220	220
Duration of test hours	72	96	44	68	120	96
Loss in grams per hour	.05	.023	.034	.044	.035	.036

[1] Darkens hardens.
[2] Slight darkening.
[3] Darkens.

In the above greases, candellila wax, a vegetable cuticle wax, provides a substantial quantity of high molecular weight aliphatic alcohols (C_{28}–C_{34} range) to stabilize the grease of Example 2. Marine pitch, which is a mixture of polymerized fatty acids, hydroxy acids, and higher alcohols, is introduced into the formulation of Example #7 for the purpose of providing the higher alcohols necessary for this preferred grease.

The oxidation inhibitors mentioned were various amine compounds, phenols, etc., known to the trade as useful for the purpose of inhibiting oxidation deterioration of greases and are not of themselves of significance in this formulation.

The alcohols which may be used for the purposes of this invention are the monohydric aliphatic alcohols of 14 carbon atoms and above, specifically cetyl and stearyl alcohols. Lauryl alcohol, like glycerine, is found to be too volatile to be of value in giving a stable, economical grease of the desired homogenous and cohesive structure. Similar results may be obtained by the use of such ingredients as candelilla wax, marine pitch or similar materials which will furnish substantial quantities of high molecular weight aliphatic alcohols.

In general, in block greases having from about 10 to about 90% of oil, and from about 30 to about 10% of alkali metal soaps, alcohols, as described above or compounds containing substantial quantities of these alcohols; will be found useful in amounts from about 1 to 10% of the alcohol or alcohol containing ingredient; the grease being substantially free of glycerine or having, in its final form, not over .5% of glycerine.

We claim:

1. A block grease composition consisting substantially, by weight, of from about 10% to about 90% of mineral oil, from about 30% to about 10% of alkali metal soaps, and from about 1% to about 10% of monohydric alcohols of at least 14 carbon atoms, and having, in finished form, not over 0.5% of glycerine.

2. A block grease composition consisting substantially, by weight, of from about 10% to about 90% of viscous mineral oil, from about 30% to about 10% of alkali metal soaps, and from about 1% to about 10% of cetyl alcohol, and having, in finished form, not over 0.5% of glycerine.

3. A block grease composition consisting substantially, by weight, of from about 10% to about 90% of viscous mineral oil, from about 30% to about 10% of alkali metal soaps, and from about 1% to about 10% of stearyl alcohol, and having, in finished form, not over 0.5% of glycerine.

4. An improved soda base block grease composition consisting substantially of viscous mineral oil, from about 10% to about 30% by weight of sodium soaps of fatty acids, and from about 1% to about 10% by weight of monohydric aliphatic alcohols of at least 14 carbon atoms, the finished grease having not over 0.5% by weight of glycerine.

5. An improved soda base block grease composition consisting substantially of viscous mineral oil, from about 10% to about 30% by weight of sodium soaps of fatty acids, and from about 1% to about 10% by weight of cetyl alcohol, and having, in finished form, not over 0.5% of glycerine.

6. An improved soda base block grease composition consisting substantially of viscous mineral oil, from about 10% to about 30% by weight of sodium soaps of fatty acids, and from about 1% to about 10% by weight of stearyl alcohol,

and having, in finished form, not over 0.5% of glycerine.

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Certificate of Correction

Patent No. 2,449,312. September 14, 1948.

GEORGE W. MURRAY ET AL.

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 28, Table I, for "(°5 consistency)" read (*#5 consistency*); same table, line 34, for "of" second occurrence, read °*F.*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of May, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.