

The present invention relates to a high-quality lithium-complex grease composition having improved anti-noise properties, a high dropping point, a long lubrication life and an excellent oxidation stability also at high temperatures.

The purpose of the present invention is to provide a lithium-complex grease composition having a long lubrication life, markedly improved anti-noise properties, a high dropping point, and an excellent oxidation stability also at high temperatures, by uniformly admixing and dispersing in a base lubricating oil a gelling agent (a), a complexing metal salt (b) and a dispersing component (c). From US—A—3,929,650 grease compositions are known comprising a thickener system of lithium hydroxy stearate and lithium borate. The composition may further contain an alkaline earth metal sulphionate and optionally a succinimide derived from alkenyl succinic acid or anhydride and alkylene polyamines.

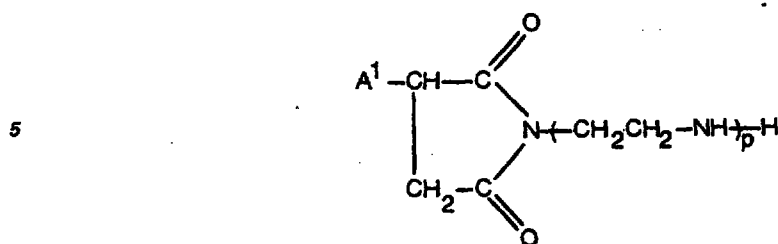
Grease compositions containing the lithium salt of a C₁₂₋₂₄ hydroxy fatty acid and the dilithium salt of azelaic, sebacic, or adipic acid and lithium salicylate, are known from US—A—3,929,651. These compositions may further comprise a naphthalene sulphonate and/or an alkylmethacrylate polymer.

This invention therefore relates to a high dropping-point lithium-complex grease composition having improved anti-noise properties, comprising a lubricating oil and the following components:

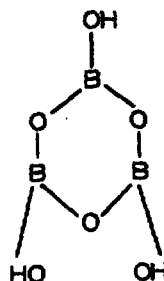
(b) at least one lithium salt selected from the group consisting of the dilithium salts of adipic acid, sebacic acid or azelaic acid and lithium salicylate, and

(c) at least one dispersing component, characterized in that component (c) is selected from the group consisting of hydrogenated styrene-butadiene copolymers, hydrogenated styrene-isoprene copolymers and ethylene-propylene copolymers, if component (b) is a dilithium salt of adipic, sebacic and/or azelaic acid; and component (c) is selected from the group consisting of a succinimide-type dispersant of formulae





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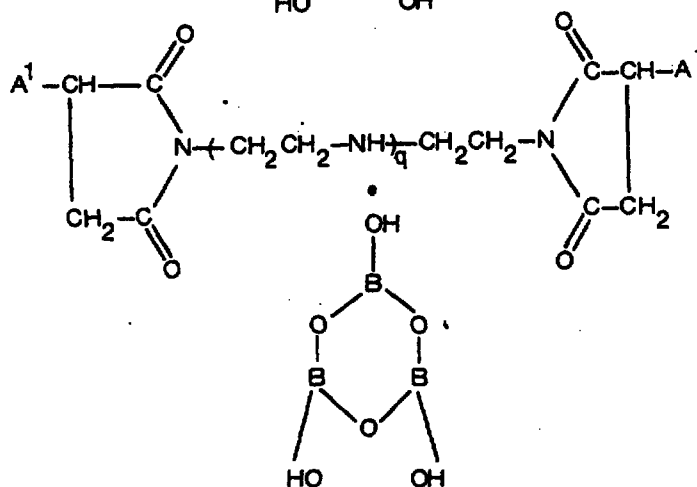
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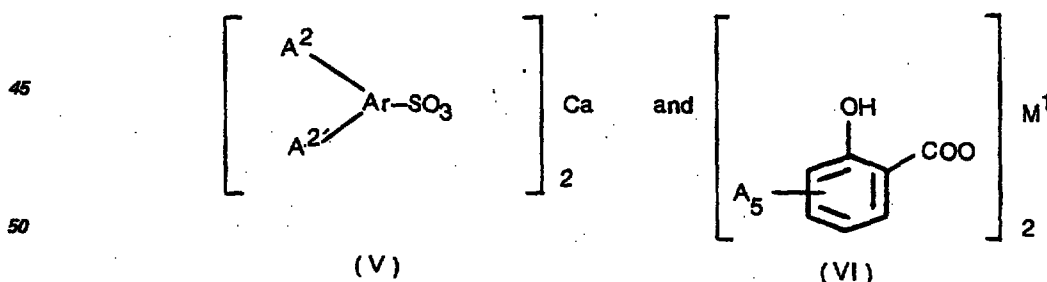
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40 wherein A¹ denotes a C₃₀ to C₂₀₀ polyisobutyl radical, p means an integer from 2 to 8 and q represents an integer from 1 to 8, and calcium sulphonate, calcium salicylate and magnesium salicylate of formulae



55 wherein A² and A^{2'} are respectively a hydrogen atom or a C₈ to C₃₀ alkyl radical; Ar means a benzene or naphthalene ring, A⁵ means a C₈ to C₂₂ alkyl radical and M¹ denotes Ca or Mg, if component (b) is lithium salicylate.

Lubricating oil

60 Any conventional lubricating oil can be used. While a typical one is a mineral oil, use can also be made, singly or in combination with the mineral oil, of a synthetic oil including ester oils, such as a diester oil, e.g. dioctyl azelate, and a tetra-ester oil, e.g. the pentaerythritol ester of an aliphatic monocarboxylic acid, or poly-alpha-olefin oligomers, such as octene-1/-decene-1 copolymers, having viscosity of 41.0 cSt at 37.7°C, a viscosity index (V.I.) of 130 and a flash point of 223°C.

65 The lubricating oil may have a viscosity ranging from about 2 to 500 cSt, preferably from 20 to 200 cSt, at 40°C.

Component (a)

The C₁₀ to C₃₄ fatty acids include the saturated or unsaturated higher aliphatic monocarboxylic acids, especially those acids containing 16 to 22 carbon atoms, such as stearic acid and oleic acid.

The C₁₂ to C₂₄ hydroxy fatty acids include saturated or unsaturated monocarboxylic fatty acids containing a hydroxyl radical, especially those acids containing 18 carbon atoms and a hydroxyl radical in the 9-, 10-, or 12- position, such as 12-hydroxy stearic acid and ricinolic acid.

The lithium salts of the above fatty acids and hydroxy fatty acids can be singly used or combinedly with one or more of others. In addition, when said lithium salts are prepared, said carboxylic acids can be reacted with lithium hydroxide not only in the form of free acids but also as glycerides.

Component (c)

This component is used for the acceleration of the fine dispersion of the components (a) and (b) in the base oil, and the compounds mentioned can be employed singly or combinedly with one or more of other ones.

Conventional VI-improvers can be used, such as:

1. hydrogenated styrene-butadiene copolymers, especially those of the mean molecular weights ranging from 20,000 to 250,000 and styrene contents ranging from 25 to 70 weight %;

2. hydrogenated styrene-isoprene copolymers, especially those of the mean molecular weights ranging from 20,000 to 250,000 and styrene contents ranging from 20 to 65 weight %;

3. ethylene-propylene copolymers, especially those of the mean molecular weights ranging from 20,000 to 250,000 and ethylene contents ranging from 10 to 30 weight %.

Suitable succinimide type dispersants are synthesized by reaction of polyamines with the polybutenyl succinic anhydrides obtained by the reaction of polybutenes and maleic anhydride.

The suitable metal salts used as component (c) may be neutral, basic or super-basic. Combinations of the metal salts may also be suitable.

Preparation of grease composition

The grease composition according to the present invention can be prepared by uniformly admixing and finely dispersing the three components (a), (b) and (c) in the base oil mentioned above. While the amounts of these three components compounded in the base oil above are not necessarily critical but can be variable for individual components, it is generally advantageous to use them in the following proportions per 100 weight parts (pbw) of the base oil;

Component (a): 2 to 40 weight parts, preferably 5 to 30 weight parts

Component (b): 0.05 to 20 weight parts, preferably 0.5 to 10 weight parts

Component (c): 0.01 to 10 weight parts, preferably 0.1 to 5 weight parts.

Also, it is particularly preferable to use the components (a) and (b) in the following mol ratio within the above ranges of the proportions;

Component (a)/Component (b) mol ratio=0.5 to 10, especially 1 to 5.

In the grease composition according to the present invention, use can be made, in addition to the three components (a), (b) and (c) above, of other ordinary lubricant-additives, such as neutral or basic metallic detergents, such as basic Ca salicylate, or ashless dispersants, rust inhibitors (e.g., paraffin oxide, amino imidazoline or barium dinonylnaphthalene-sulphonate), oxidation inhibitors (e.g. 2,6-ditertiary butyl-4-methylphenol, N-phenyl- naphthylamine or diphenylamine octylate) and extreme-pressure additives (e.g. zinc naphthenate, or other zinc compounds such as zinc dithiophosphates or zinc-oxide, lead naphthenate, sulphurized oils and fats, or tricresyl phosphate), in the proportions ordinarily employed.

The grease composition of the present invention can e.g. be prepared in the following manner.

A component (c) is first admixed and dissolved in a base oil, and the fatty acid or hydroxy fatty acid for the preparation of the lithium soap, as a component (a), is admixed and dissolved in the mixture thus obtained, at 70 to 80°C. Then, the lithium hydroxide roughly in an equivalent amount to the fatty acid or hydroxy fatty acid above is admixed in the resulting mixture at 80 to 90°C to form a soap, and the mixture is further heated to 140 to 150°C under pressure for dehydration. After the dicarboxylic acid for the formation of a component (b) is admixed in the dehydrated mixture, the resulting mixture is cooled to 80 to 100°C and further admixed with the lithium hydroxide roughly in an equivalent amount to said dicarboxylic acid and the final mixture is again dehydrated by heating to 140 to 150°C under pressure. The last dehydrated mixture is further heated to 195 to 215°C, then cooled to 175 to 193°C, maintained at this temperature for about 10 to 40 min. and finally cooled to the room temperature.

The lithium complex grease composition according to the present invention and thus prepared has a very high dropping point, satisfactory anti-noise properties and very long lubricating life and exhibits exceedingly high performance as a lubricating grease. Therefore, the present grease composition can be suitably used, for example, for the lubrication of the bearings fitted in electric motors as well as of the wheel bearings in automotive bearing/axle integrated structures. Furthermore, these greases make little noise even if used in the bearings of air-conditioners and others, giving no environmental injury.

The invention is illustrated in Examples 1, 3, 5—8, 14 and 16—22 below. Examples 2, 4, 9—13, 15, 23 and 24 are included for comparative purposes.

(12)

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Example 1

2,233.5g of a refined mineral oil (paraffinic, VI:102, pour pt. -15°C , viscosity: 44.9 cSt at 37.8°C and 6.4 cSt at 98.9°C), 300g of the 10% solution of a hydrogenated styrene-butadiene copolymer (mesh mol. wt.: about 130,000, styrene content: 59 weight %) in the mineral oil above and 270g of 12-hydroxy stearic acid were charged into a 8 litre autoclave, and the contents were heated to 80°C under stirring in 30 to 40 min to completely dissolve the 12-hydroxy stearic acid.

Then, 300g of a hot aqueous solution (95°C) containing 38.5g of lithium hydroxide were admixed in the autoclave, the contents were stirred for about 10 min under stirring and normal pressure at about 90°C and, then, slowly heated under pressure to about 145°C . At this temperature, the contents of the autoclave were further stirred for about 15 min under pressure (about 2.5 to 2.8kg/cm^2) and, subsequently, the pressure was released with the moisture being removed.

After dehydration, the contents were admixed with 67.8g of azelaic acid, the mixture was slowly cooled to about 90°C under stirring, and 250g of a hot aqueous solution (95°C) containing 30.2g of lithium hydroxide were admixed in the mixture. The resulting mixture was slowly heated to 145 to 155°C under stirring and pressure in 1 to 1.5 hrs, and, at this temperature, the autoclave was released of the pressure and removed of the moisture.

After the dehydration, the contents of the autoclave were again heated to 195 to 215°C and, then, left cooling under stirring to 188 to 192°C . The contents were kept at this temperature for 20 to 30 min, then left cooling to about 160°C . At this temperature 60g of the oxidation inhibitor, diphenylamine octylate, were admixed in the contents, the mixture was cooled to about 80 to 85°C under stirring in 30 to 60 min and treated in a homogenizer at this temperature.

The properties of the grease composition thus obtained were as shown below:

Consistency (unworked)	: 240
(after 60 strokes)	: 245
Shell roll test* ($100^{\circ}\text{C}\times 5$ hrs)	:
(before test)	: 120
(after test)	: 152
(difference)	: +32
Dropping point** (0°C)	: 257
Grease dust-noise test*** (after 120 sec.)	: 92 (mean of 5 measurements)

* Roll stability test according to ASTM D1831,

** according to JIS K 2220,

*** according to the method described in Japanese Patent Publication No. 2357/78.

Comparison Example 2

A grease composition was prepared in a similar manner to that in Example 1 except that 2,533.5g of the refined mineral oil were used without employing the hydrogenated styrene-butadiene copolymer mentioned in Example 1. The properties of the product were as follows:

Consistency (unworked)	: 246
(after 60 strokes)	: 248
Shell roll test ($100^{\circ}\text{C}\times 5$ hrs)	:
(before test)	: 123
(after test)	: 148
(difference)	: +25
Dropping point (0°C)	: 232
Grease dust-noise test (after 120 sec.)	: 7,534 (mean of 5 measurements)

Examples 3 to 8

Grease compositions were prepared by employing the various components shown in Table 1 below in a similar manner to that in Example 1, and the properties of these compositions are collectively tabularized in Table 1.

TABLE I

Component/Property	Composition/Example			Composition (weight %)			8	Market grease A (%)	Market grease B (%)
(a) 12-hydroxy stearic acid Hardened castor oil	3	4	5	6	7	8	9.0	9.0	
(b) Azelaic acid	2.26	2.26	2.26	2.26	2.26	2.26	2.26		
(c) Styrene-isoprene copolymer (hydrogenated) (1) Polymethylmethacrylate (2)	1.0	1.0		1.0	1.0	0.67	0.22		
Ethylene-propylene copolymer (3)			1.0						
Lithium hydroxide monohydrate	2.29	2.29	2.29	2.29	2.24	2.29			
Oxidation inhibitor (4)	2.0	2.0	2.0	2.0	2.0	2.0			
Base oil (refined mineral oil) (5)	83.45	83.45	83.45	83.15	83.50	83.56			
Properties :									
Consistency (unworked)	231	246	254	230	271	240		285	240
(after 60 strokes)				241				280	238
Shell roll test (100°C x 5 hrs)									
(before test)	115	123	127	116	136	120		142	120
(after test)	139	140	168	140	163	141		153	135
(difference)	+24	+17	+41	+24	+27	+21		+11	+15



TABLE I Continued..

Component/Property	Composition/Example			Composition (weight %)			Market grease A (6)	Market grease B
	3	4	5	6	7	8		
Dropping point (°C)	254	254	257	>262	261	244	>275	>275
Grease dust-noise test (after 120 sec) (mean of 5 measurements)	67	141	133	51	259	91	3.399	1.174

Note:

- (1) mean mol. wt.: about 102,000, styrene content: 31 wt. %
- (2) mean mol. wt.: about 260,000
- (3) mean mol. wt.: about 130,000, ethylene content: 30 wt. %
- (4) the same as that used in Example 1
- (5) the same as that used in Example 1
- (6) ordinary lithium-complex grease containing
- (7) Li 12-hydroxystearate, Li₂ suberate, Li borate and Li₂ salicylate but no polymer.

Example 9

Grease composition 9 was prepared by treating the various components shown in following Table 2 in similar manners to that in Example 1. The properties of this composition are shown in Table 2.

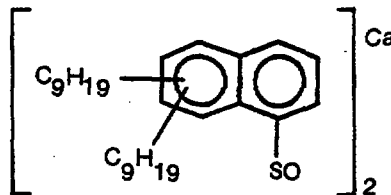
TABLE 2

Component/Property	Composition (weight %)
(a) 12-hydroxystearic acid	9.0
(b) Azelaic acid	2.26
(c) Calcium sulphonate ⁽³⁾	1.0
Lithium hydroxide monohydrate	2.29
Oxydation inhibitor ⁽¹⁾	2.0
Base oil (refined mineral oil) ⁽²⁾	83.45
Properties	
Consistency (unworked)	230
Shell roll test (100°C x 5 hrs)	
(before test)	115
(after test)	140
(difference)	+25
Dropping point (°C)	238
Grease dust-noise test (after 120 sec)	166

(1) the same as that used in Example 1.

(2) the same as that used in Example 1.

(3) Calcium dinonylnaphthalene-sulphonate



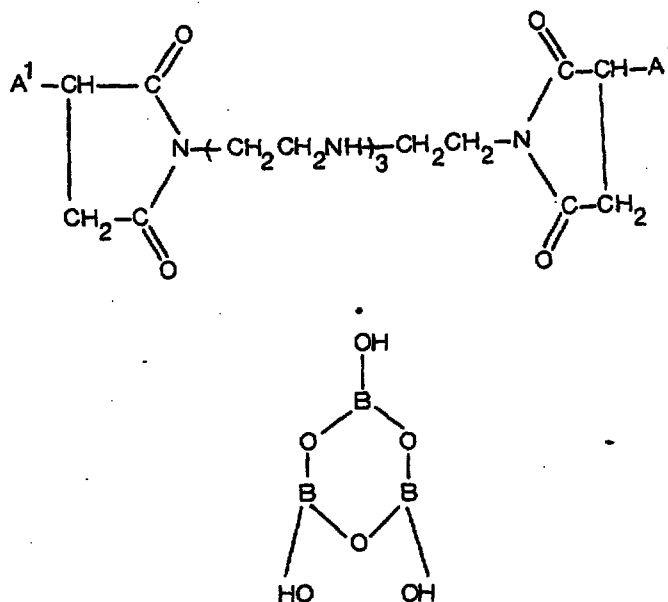
39 weight parts of the compound above dissolved in 100 weight parts of the refined mineral oil.

Grease compositions were prepared by treating the various components shown in following Table 3 in similar manners to that in Example 1. The properties of these compositions are collectively tabularized in Table 3.

TABLE 3

Component/Property	Composition/Example		Composition (weight %)	
	10	11	12	13
(a) 12-hydroxy stearic acid	9.0	9.0	9.0	9.0
(b) Boric acid	1.48	1.48	0.45	1.48
(c) Succinimide type dispersant (A) (1)	1.0	1.0		
Lithium hydroxide monohydrate (2)	2.30	2.30	1.60	2.30
Oxidation inhibitor	2.0	2.0	2.0	2.0
Base oil (refined mineral oil) (3)	82.22	84.22	86.95	85.22
Properties :				
Consistency (unworked)	238	246	269	231
(after 60 strokes)			263	
Shell roll test (100°C x 5 hrs)				
(before test)	119	123		
(after test)	142	148		
(difference)	+23	+25		
Dropping point (°C)	>270	>265	221	251
Grease dust-noise test	147	160	1,178	2,956
(after 120 sec, mean of 5 measurements)				

Note: (1)



A¹=polyisobutenyl radical of C₅₂ to C₇₆,

Mean mol. wt.=2302 (as containing boron)

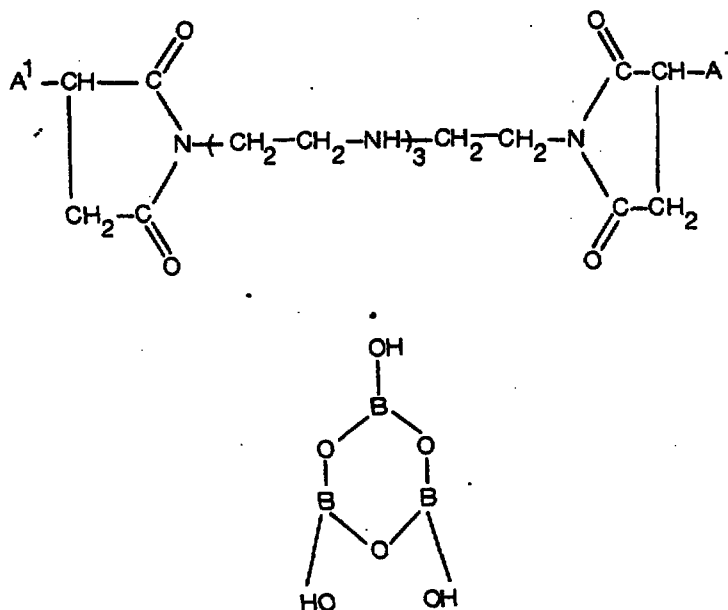
110 weight parts of the compound above dissolved in 100 weight parts of the base oil.

(2) the same as that used in Example 1.

(3) the same as that used in Example 1.

Example 14

2,521.2g of a refined mineral oil (paraffinic, VI; 102, pour point: -15°C , kin, viscosity: 44.9 cSt at 37.8°C , 6.4 cSt at 98.9°C), 30g of a succinimide (A) (ref. Note 1) and 270g of 12-hydroxy stearic acid were introduced into a liter autoclave and the contents were heated to 80°C under stirring in 30 to 40 min to completely dissolve the hydroxystearic acid. (Note 1: Succinimide (A))



A¹: C₅₂ to C₇₆ polyisobutenyl radical, mean molecular weight: 2,302 (as containing boron), 110wt. parts of the compound above dissolved in 100wt. parts of the base oil).

Subsequently, 300g of a hot aqueous solution (95°C) containing 38.5g of lithium hydroxide were admixed in the autoclave contents, which were then kept at 90°C under stirring for 5 to 15 min. After the contents were cooled to 75°C , 300g of a hot aqueous solution (93°C) containing 49.8g of salicylic acid were admixed in the contents and dissolved by stirring for 10 to 15 min. Then, 250g of a hot aqueous solution (95°C) containing 31.0 of lithium hydroxide were admixed in the resulting mixture, which was then gradually heated under stirring and pressure. When this mixture arrived at 145 to 150°C after 1 to 1.5 hrs, the autoclave was released of the pressure and the contents of were dehydrated at this temperature in 15 to 25 min. After the dehydration, the contents of the autoclave were further heated to 195 to 205°C , then cooled to 188 to 192°C under stirring and, after being kept at this temperature for 20 to 30 min, further cooled to about 160°C . At this temperature, 60g of an oxidation inhibitor were admixed in the contents, the mixture thus obtained was cooled by stirring to about 80 to 85°C in 30 to 60 min and then treated in a homogenizer at this temperature.

The properties of the grease composition thus prepared were as follows:

	Consistency *1 (unworked)	: 239
5	" (after 60 strokes)	: 236
	Shell roll test *2 (100°C×5 hrs)	:
	(before test)	: 119
10	(after test)	: 149
	(difference)	: +30
15	Dropping point *1 (0°C)	: 280
	Oil separation *1 (100°C×24 hrs)	: 2.2%
	Water resistance *1 (38°C×1 hr)	: 2.0%
20	Copper-plate corrosion *1 (100°C×24 hrs)	: pass
	Grease dust-noise test *3 (after 120 sec)	: 68 (mean of 5 measurements)
25	Functional life *4	: 2540 hrs

Note:

- *1: according to JIS K 2220,
 *2: roll stability test according to ASTM D1831,
 *3: according to the method described in Japanese Patent Publication No. 2357/78,
 *4: according to ASTM D1741.

Example 15

A grease composition was prepared in a similar manner to that in Example 1 except that 2,531.2g of the refined mineral oil were employed without the succinimide (A) being admixed, the properties of the resulting composition were as follows:

	Consistency (unworked)	: 278
40	(after 60 strokes)	: 266
	Shell roll test (100°C×5 hrs)	:
	(before test)	: 139
45	(after test)	: 173
	(difference)	: +34
50	Dropping point (°C)	: 195
	Grease dust-noise test (after 120 sec)	: 4.114 (mean of 5 measurements)
55	Functional life	: 1,240 hrs

Examples 16 to 24

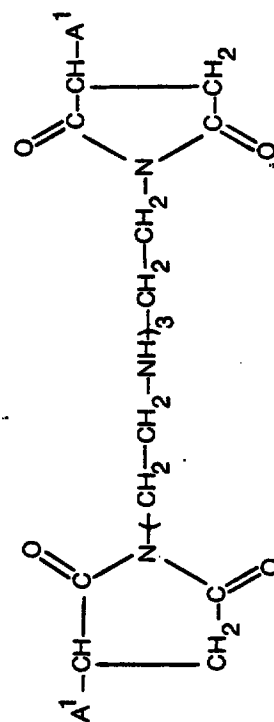
Seven grease compositions were prepared by treating the various components shown in Table 4 below in similar ways to that in Example 26 and the properties thereof are collectively tabularized in Table 4. Also, the properties of a market grease comprising the lithium soap of 12-hydroxystearic acid are shown as Example 23 in the table as well. In addition, in Example 24 in the Table a grease is prepared in a similar manner to that in Example 14 but by employing an increased amount of the refined mineral oil without the components (b) and (c) being admixed.

TABLE 4

Component/Property	Composition/Example				Composition (weight %)									
	16	17	18	19	20	21	22	23	24					
(a) 12-hydroxy stearic acid	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0					
(b) Salicylic acid	1.66	1.66	0.66	1.66	1.66	1.66	1.66	1.66	1.66					
(c) Succinimide (B), (1)	1.0													
Succinimide (C), (2)		1.0												
Succinimide (D), (3)			1.0											
Calcium sulphonate, (4)				1.0										
Magnesium salicylate, (5)					1.0									
Calcium salicylate, (6)						1.0								
Lithium hydroxide monohydrate	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30					
Oxidation inhibitor (7)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0					
Base oil (refined mineral oil), (8)	84.04	84.04	84.04	84.04	84.04	84.04	84.04	84.04	84.04					
Properties :														
Consistency (unworked)	221	218	255	229	258	241	272	273	234					
" (after 60 strokes)	222	214	248	240	226	251	239		232					
Shell roll test (before test)	110	108	128	121	114	130	121	137	117					
(100°C x 5 hrs) (after test)	138	129	157	154	151	163	160	168	165					
(difference)	+28	+21	+29	+33	+37	+33	+39	+31	+48					
Dropping point (°C)	>280	>280	>280	>280	>280	>280	>280	180	200					
Grease dust-noise test (after 120 sec)	48	102	80	66	121	65	93	50	140					
Functional life (hr)	3020	1860	2540	2660	1780	2480	2800	500	480					

Note for Table 4:

(1)

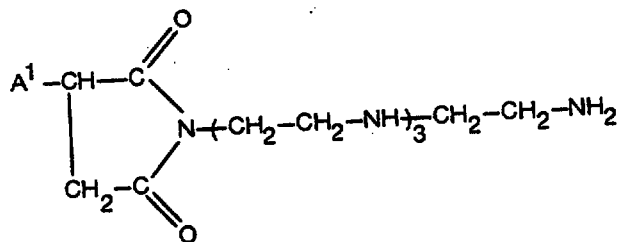




A¹: C₅₂ to C₇₆ polyisobutenyl radical.

Mean molecular weight: 2,170.

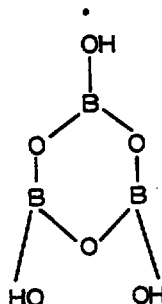
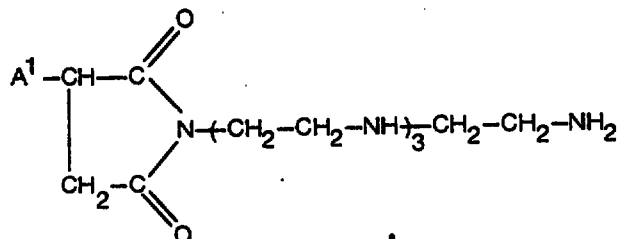
110 weight parts of the above compound dissolved in 100 weight parts of a refined mineral oil.
(2)



A¹: C₅₂ to C₇₆ polyisobutenyl radical.

Mean molecular weight: 1,172.

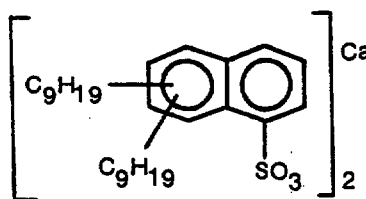
160 weight parts of the above compound dissolved in 100 weight parts of a refined mineral oil.
(3)



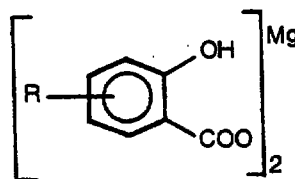
A¹: C₅₂ to C₇₆ polyisobutenyl radical.

Mean molecular weight: 1,304.

140 weight parts of the compound above dissolved in 100 weight parts of a refined mineral oil.
(4) Calcium dinonylnaphthalene-sulphonate



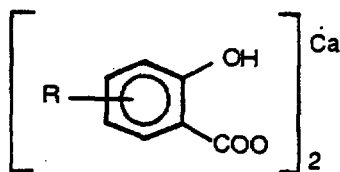
39 weight parts of the compound above dissolved in 100 weight parts of a refined mineral oil.
(5) Magnesium alkyl-salicylate



R: C₁₀ to C₁₆ alkyl radical.

30 weight parts of the compound above dissolved in 100 weight parts of a refined mineral oil.

(6) Calcium alkyl-salicylate



R: C₁₀ to C₁₈ alkyl radical.

30 weight parts of the compound dissolved in 100 weight parts of a refined mineral oil.

(7) The same as that used in Example 26.

(8) The same as that used in Example 26.

Examples 1, 3, 5—8, 14, 16—22 are according to the present invention; Examples 2, 4, 9—13, 15, 23 and 24 have been included for comparison.

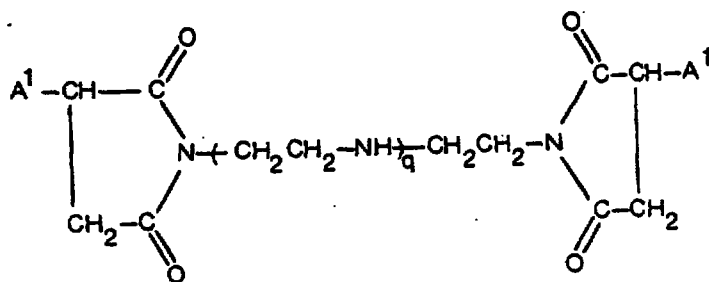
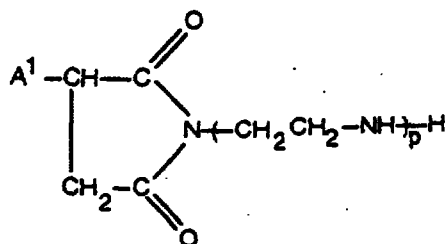
Claims

1. High dropping-point lithium-complex grease composition having improved anti-noise properties, comprising a lubricating oil and the following components:

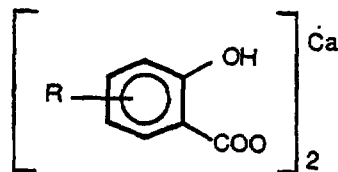
(a) at least one lithium soap selected from the group consisting of the lithium salts of C₁₀ to C₃₄ fatty acids and C₁₂ to C₂₄ hydroxy fatty acids,

(b) at least one lithium salt selected from the group consisting of the dilithium salt of adipic acid, sebacic acid or azelaic acid and lithium salicylate, and

(c) at least one dispersing component, characterized in that component (c) is selected from the group consisting of hydrogenated styrene-butadiene copolymers, hydrogenated styrene-isoprene copolymers and ethylene-propylene copolymers, if component (b) is a dilithium salt of adipic, sebacic and/or azelaic acid; and component (c) is selected from the group consisting of a succinimide-type dispersant of formulae



(6) Calcium alkyl-salicylate



R: C₁₀ to C₁₆ alkyl radical.

30 weight parts of the compound dissolved in 100 weight parts of a refined mineral oil.

(7) The same as that used in Example 26.

(8) The same as that used in Example 26.

Examples 1, 3, 5—8, 14, 16—22 are according to the present invention; Examples 2, 4, 9—13, 15, 23 and 24 have been included for comparison.

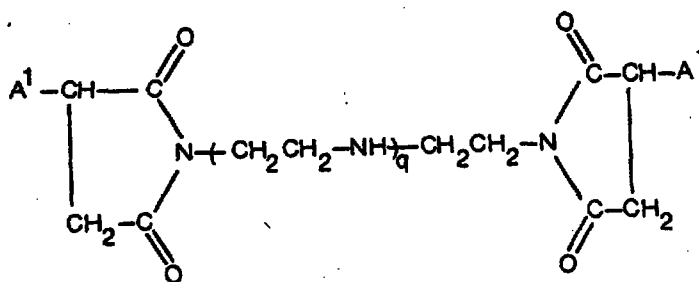
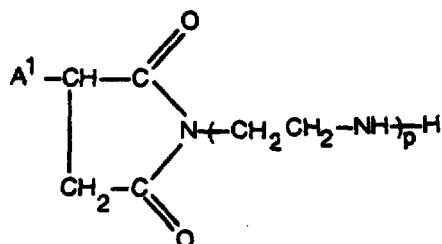
Claims

1. High dropping-point lithium-complex grease composition having improved anti-noise properties, comprising a lubricating oil and the following components:

(a) at least one lithium soap selected from the group consisting of the lithium salts of C₁₀ to C₃₄ fatty acids and C₁₂ to C₂₄ hydroxy fatty acids,

(b) at least one lithium salt selected from the group consisting of the dilithium salt of adipic acid, sebacic acid or azelaic acid and lithium salicylate, and

(c) at least one dispersing component, characterized in that component (c) is selected from the group consisting of hydrogenated styrene-butadiene copolymers, hydrogenated styrene-isoprene copolymers and ethylene-propylene copolymers, if component (b) is a dilithium salt of adipic, sebacic and/or azelaic acid; and component (c) is selected from the group consisting of a succinimide-type dispersant of formulae



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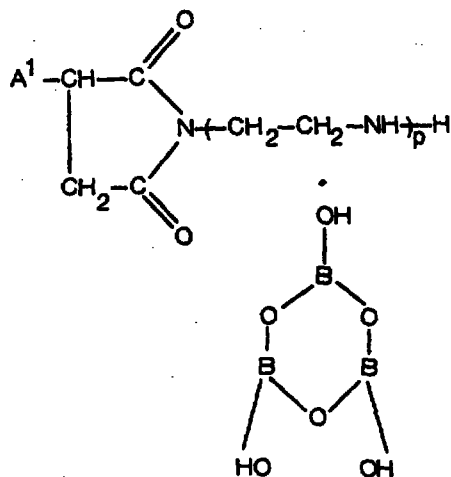
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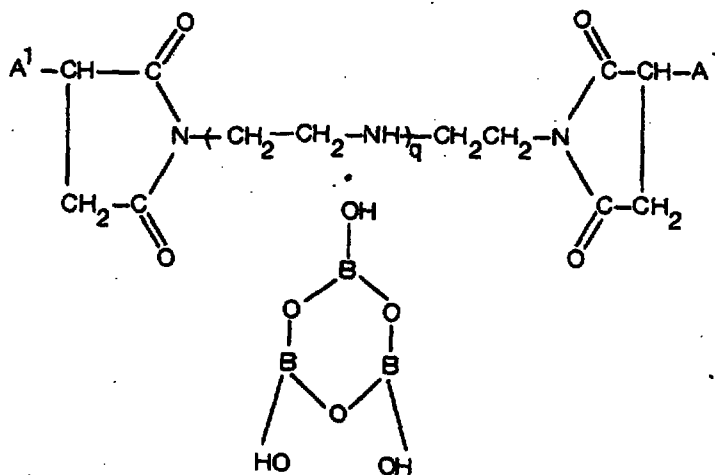
(III)

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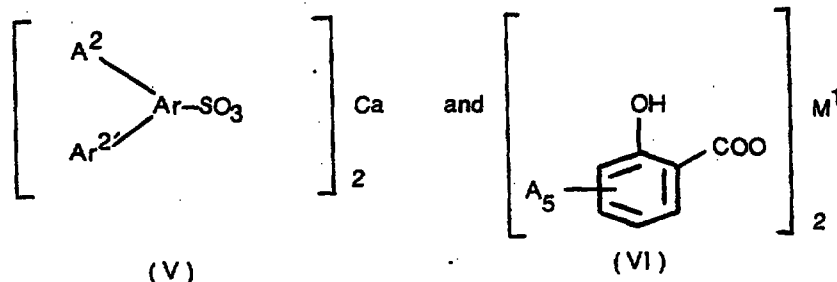
(IV)

wherein A¹ denotes a C₃₀ to C₂₀₀ polyisobutenyl radical, p means an integer from 2 to 8 and q represents an integer from 1 to 8, and calcium sulphonate, calcium salicylate and magnesium salicylate of formulae

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(V)

(VI)

wherein A² and A^{2'} are respectively a hydrogen atom or a C₈ to C₃₀ alkyl radical, Ar means a benzene or naphthalene ring, A⁵ means a C₈ to C₂₂ alkyl radical and M¹ denotes Ca or Mg, if component (b) is lithium salicylate.

Patentansprüche

1. Lithium-Komplex-Schmiermittelzusammensetzung mit hohem Tropfpunkt mit verbesserten Lärm-dämpfungseigenschaften, enthaltend ein Schmieröl und die folgenden Komponenten:

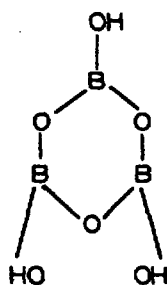
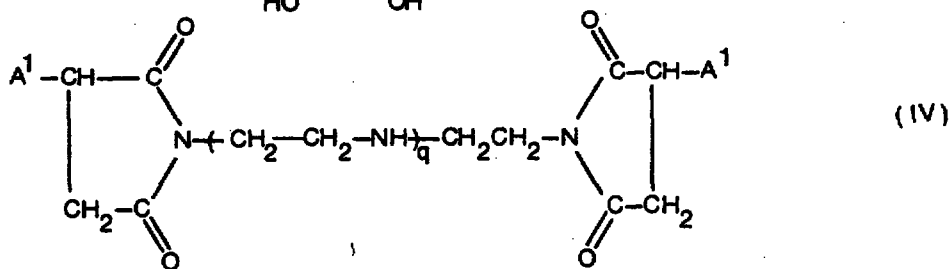
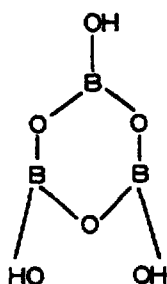
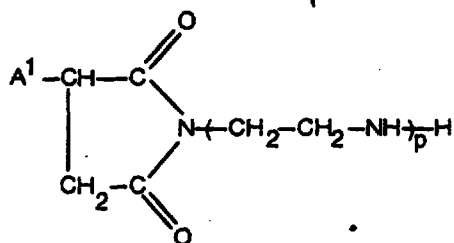
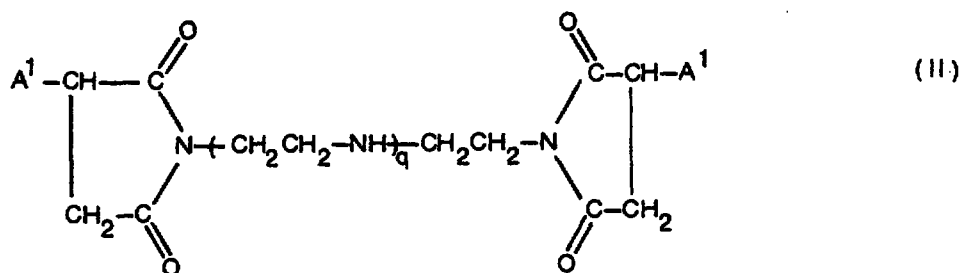
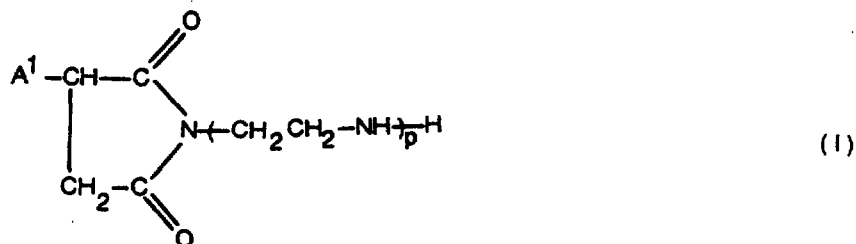
(a) mindestens eine Lithiumseife ausgewählt aus der Gruppe bestehend aus den Lithiumsalzen von C₁₀- bis C₂₄- Fettsäuren und C₁₂- bis C₂₄-Hydroxyfettsäuren,

(b) mindestens ein Lithiumsalz, ausgewählt aus der Gruppe bestehend aus dem Dilithiumsalz der Adipinsäure, Sebacinsäure oder Azelainsäure und Lithiumsalicylat, und

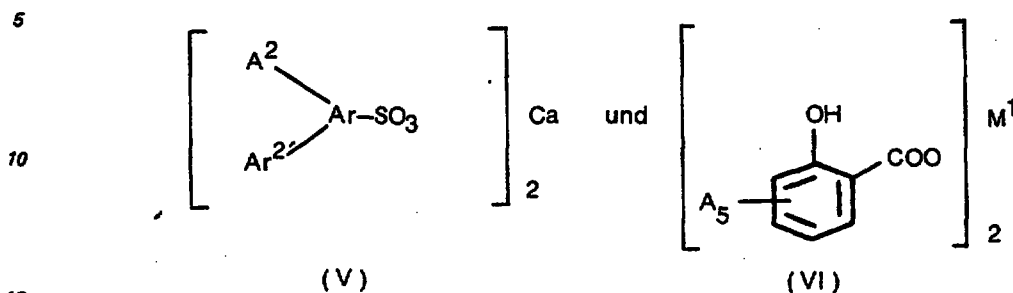


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(c) mindestens eine dispergierende Komponente, dadurch gekennzeichnet, daß die Komponente (c) ausgewählt ist aus der Gruppe bestehend aus hydrierten Styrol-Butadien-Mischpolymerisaten, hydrierten Styrol-Isopren-Mischpolymerisaten und Äthylen-Propylen-Mischpolymerisaten, wenn die Komponente (b) ein Dilithiumsalz der Adipin-Sebacin- und/oder Azelainsäure ist; und das die Komponente (c) ausgewählt ist aus der Gruppe bestehend aus einem dispergierenden Mittel vom Succinimid-Typ der Formeln:



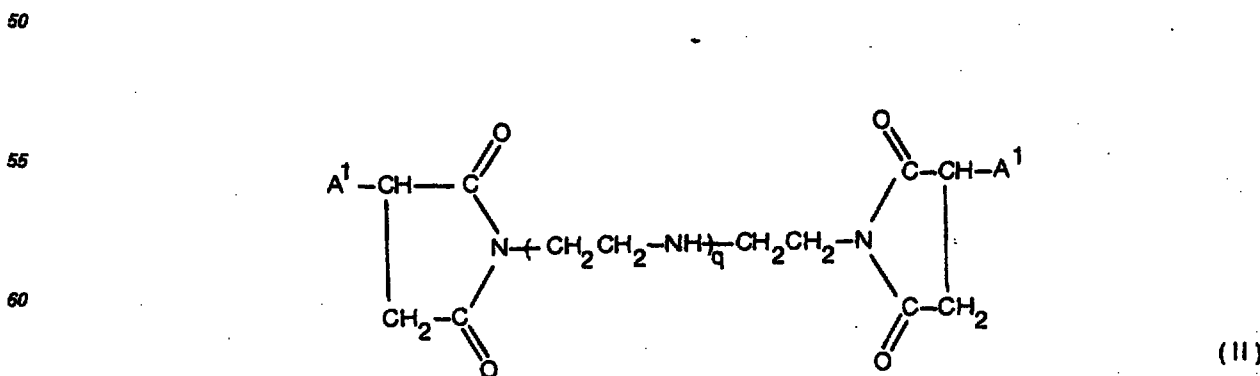
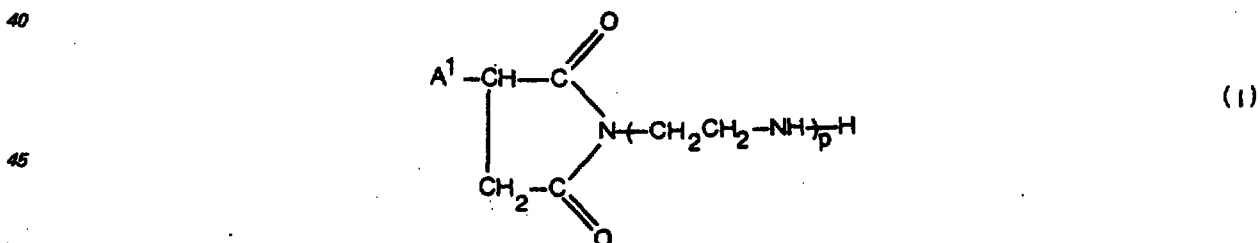
in welchem A^1 einen C_{30} — C_{200} -Polyisobutenylrest darstellt, p eine ganze Zahl von 2 bis 8 bedeutet und q eine ganze Zahl von 1 bis 8 ist, und Calciumsulfonaten, Calciumsalicylaten und Magnesiumsalicylaten der Formeln

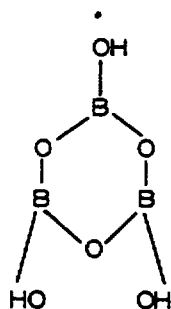
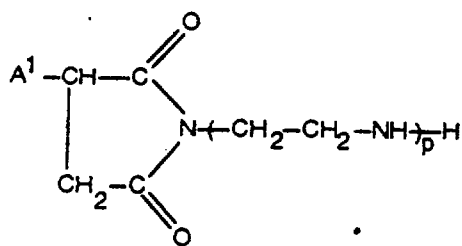


20 in welchem A^2 und $A^{2'}$ jeweils ein Wasserstoffatom oder ein C_8 — C_{30} -Alkylrest sind, Ar ein Benzolring oder Naphthalinring ist, A^5 eine C_8 — C_{22} -Alkylrest ist und M^1 Ca oder Mg bedeutet, wenn die Komponente (b) Lithiumsalicylat ist.

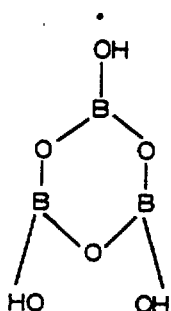
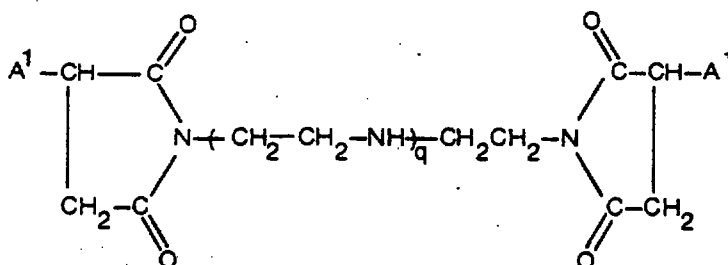
Revendications

- 25 1. Composition de graisse à haut point de goutte avec des propriétés antibruits améliorées, contenant un complexe de lithium, comprenant une huile lubrifiante et les composants suivants:
- (a) au moins un savon de lithium choisi dans le groupe constitué par les sels de lithium des acides gras en C_{10} — C_{34} et des hydroxyacides gras en C_{12} — C_{24} ,
- (b) au moins un sel de lithium choisi dans le groupe constitué par les sels de dilithium de l'acide
- 30 adipique, de l'acide sébacique ou de l'acide azélaïque et le salicylate de lithium, et
- (c) au moins un composant dispersant,
- caractérisée en ce que le composant (c) est choisi dans le groupe constitué par les copolymères hydrogénés de styrène-butadiène, les copolymères hydrogénés de styrène-isoprène et les copolymères d'éthylène-propylène lorsque le composant (b) est un sel de dilithium d'acide adipique, sébacique et/ou
- 35 azélaïque; et le composant (c) est choisi dans le groupe constitué par un dispersant de type succinimide répondant aux formules



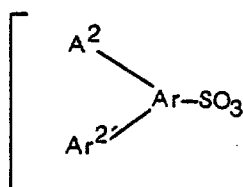


(III)

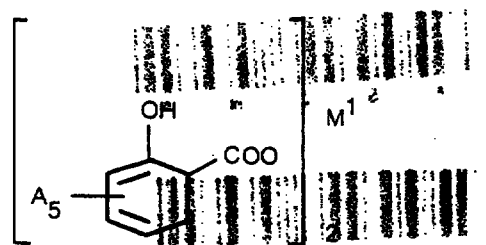


(IV)

dans lesquelles A¹ représente un radical polyisobutényle en C₃₀ à C₂₀₀, p est un entier de 2 à 8 et q représente un entier de 1 à 8, et le sulfonate de calcium, salicylate de calcium et salicylate de magnésium de formules



(V)



(VI)

dans lesquelles A² et A^{2'} sont respectivement un atome d'hydrogène ou un radical alkyle en C₈ à C₃₀; Ar est un cycle benzène ou naphthalène, A⁵ est un radical alkyle en C₈ à C₂₂ et M¹ est Ca ou Mg, lorsque le composant (b) est le salicylate de lithium.

