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(54) IMPROVED TRACTION FLUID.

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Description

This invention relates to an improved traction fluid. More particularly, it relates to a traction fluid comprising a blend of an ester compound or its derivative in which a cyclohexyl ring is connected to a linear-chain hydrocarbon through an ester linkage, and a defined hydrocarbon polymer or defined polymeric ester as the base oil.

Traction drive power transmissions which transmit power to a driven part through a traction drive mechanism in automobiles and industrial machinery have recently attracted attention, and in recent years research and development in this area has been progressing. A traction drive mechanism is a power transmitting mechanism using a rolling friction. Unlike conventional drive mechanisms, it does not use any gears. This enables reduced vibrations and noise, as well as providing smooth speed changes in highspeed rotation. An important goal in the automobile industry is to improve automobile fuel economy. It has been suggested that if the traction drive were to be used for automobile transmissions, in order to convert the transmission to the continuous variable-speed transmission, that fuel consumption could be reduced by at least 20% over conventional transmission systems. This is because the drive can always be in the optimum fuel consumption region of an engine. Recent studies have resulted in developing materials having high fatigue resistance, and in a theoretical analysis of traction mechanisms. As regards traction fluids, the correlation of traction coefficients is gradually being understood on a level of the molecular structure of the components. The term "traction coefficient" as used herein is defined as the ratio of the tractional force that is caused by slipping at the contact points between rotators which are in contact with each other in a power transmission of the rolling friction type to the normal load.

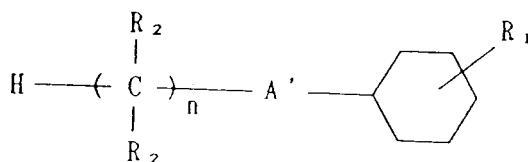
A traction fluid must be comprised of a lubricating oil having a high traction coefficient. It is known that a traction fluid possessing a molecular structure having a naphthene ring exhibits such a high performance. "Santotrack®," manufactured by the Monsanto Chemical Company, is widely known as a commercially available traction fluid. Japanese Patent Publication No. 47-35763 discloses di(cyclohexyl)alkane and dicyclohexane as traction fluids having a naphthene ring. This patent publication discloses that a fluid obtained by incorporating the above-mentioned alkane compound in perhydrogenated (α -methyl)styrene polymer, hydrindane compound or the like, has a high traction coefficient. Further, Japanese Patent Laid Open No. 59-191797 discloses a traction fluid containing an ester compound having a naphthene ring. It discloses that an ester obtained by the hydrogenation of the aromatic nucleus of dicyclohexyl cyclohexanedicarboxylate or dicyclohexyl phthalate is preferred as the traction fluid.

JP-A-61188495 describes a synthetic lubricating fluid comprising a cyclohexyl cyclohexanecarboxylate and a poly (α -olefin).

As mentioned above, in recent years there has been progress in the development of continuous variable-speed transmissions in the automobile industry. The higher the traction coefficient of the traction fluid, the larger the allowable transmission force in the same device. This helps reduce the size of the entire device, with a corresponding reduction in polluting exhaust gas emissions. Therefore, there is a need for a fluid having a traction coefficient which is as high as possible. However, the use of the currently commercially available traction fluid exhibiting the highest performance of all such currently commercially available fluids in such a traction drive device performs unsatisfactorily in respect to the traction coefficient. Further, such a traction fluid is rather costly. The traction fluid which has been proposed in Japanese Patent Publication No. 46-35763 contains α -methylstyrene polymer or its analogue as a component and, therefore, is also has an unsatisfactory performance and cost.

The inventors have made extensive and intensive studies to develop a traction fluid which not only exhibits a high traction coefficient, but is also economical. As a result the inventors found that the combination of a specific amount of a given hydrocarbon polymer, or given polymeric ester and an ester compound or its derivative in which a cyclohexyl ring is connected to a linear-chain hydrocarbon through an ester linkage, can provide a high-performance and economical base oil fluid. This invention is based on this finding.

This invention relates to a traction fluid characterized by being a blend of (i) an ester or its derivative, in which the ester is represented by the general formula:



wherein A' is an ester linkage of -COO- or -OOC-, n is an integer of 1 to 14, R₁ is a member selected from among a hydrogen atom and alkyl groups having 1 to 8 carbon atoms, and R₂s are the same or different and are a member selected from among a hydrogen atom and alkyl groups having 1 to 3 carbon atoms, with (ii) from 0.1 to 95% by weight of a polyolefin, a hydrocarbon polymeric compound having a naphthene ring or an alkylstyrene polymer, or a polymer of an ester compound having a side chain of an alkyl group and/or cyclohexyl ring, component (ii) having a traction coefficient of 0.075 to 0.085.

A first object of this invention is to provide a high-performance traction fluid having a high traction coefficient. A second object of this invention is to provide a traction fluid which is not only economical but is also readily available and easily applicable to transmissions.

The traction fluid of this invention comprises a base oil comprised of two components, i.e., component A comprised of an ester or its derivative, and a specific amount of component B comprised of a defined hydrocarbon polymer or defined polymeric ester

The component(i) of this invention is an ester compound or its derivative in which a cyclohexyl ring is connected to a linear-chain hydrocarbon through an ester linkage and has the above-mentioned structural formula. A' of the ester linkage is -COO- or -OOC-, and the number, n, of the carbon atoms in the hydrocarbon skeleton, is 1 to 14, preferably 2 to 10. When n is zero, the traction coefficient is low, while when n is 15 or more the viscosity is unfavorably high. This ester or derivative thereof prepared by the methods stated below has a viscosity of 3 to 150 cst, preferably 4 to 120 cst, at 40° C, and 1 to 20 cst, preferably 1 to 16 cst, at 100° C, Examples of the derivative of the ester include an amino compound, a halide compound, and an ether compound.

The component (i) can be prepared by any of the following methods: The first method comprises an esterification reaction of a monohydric alcohol with a cyclohexanecarboxylic acid compound. The monohydric alcohol has 1 to 14 carbon atoms, preferably 2 to 10 carbon atoms, in its main chain. Specifically, examples of the monohydric alcohol include ethanol, propanol, 2-propanol, butanol, 2-methyl-2-propanol, 3,3,5-trimethyl-1-hexanol, and 3,3,5,5-tetramethyl-1-hexanol. Examples of the cyclohexanecarboxylic acid compound include, besides cyclohexanecarboxylic acid, those having an alkyl group with 1 to 8 carbon atoms, e.g., methylcyclohexanecarboxylic acid, ethylcyclohexanecarboxylic acid, etc. Cyclohexanecarboxylic acid is particularly preferred. The esterification reaction is conducted in the presence of an excess amount of the alcohol or acid. When the esterification is conducted under excess acid conditions, 1 mol of the monohydric alcohol compound is reacted with 1 to 2 mol (particularly preferably 1.2 to 1.8 mol) of the acid. The reaction temperature is about 150 to 250° C, preferably 170 to 230° C, and the reaction time is 10 to 40 hr, preferably 15 to 25 hr. Although the esterification reaction may be conducted under either elevated or reduced pressures, it is preferable to do so at atmospheric pressure, from the standpoint of ease of reaction operation. Under these conditions the excess acid serves as a catalyst. An alkylbenzene such as xylene or toluene can be added in a suitable amount as a solvent. The addition of the solvent enables the reaction temperature to be easily controlled. As the reaction proceeds, water formed during the reaction evaporates. The reaction is terminated when an equimolar amount of the water, with respect to the alcohol, has evaporated. The excess acid is neutralized with an aqueous alkaline solution and removed by washing with water. When an acid which is difficult to extract with an alkali washing is used, the reaction is conducted using equimolar amounts of the acid and the alcohol in the presence of a catalyst. Examples of the catalyst include phosphoric acid, p-toluenesulfonic acid, and sulfuric acid. The most preferable catalyst is phosphoric acid, because it enhances the reaction rate and increases the yield of the ester. Finally, the reaction product is distilled under reduced pressure to remove water and the solvent, thereby obtaining the ester compound of this invention.

When the esterification reaction is conducted under excess alcohol conditions, 1 mol of the cyclohexanecarboxylic acid compound is reacted with 1 to 2 mol (particularly preferably 1.2 to 1.8 mol) of the alcohol. The reaction temperature is about 150 to 250° C, preferably 170 to 230° C, and the reaction time is 10 to 40 hr, preferably 15 to 25 hr. Although the esterification reaction may be conducted under either elevated or reduced pressures, it is preferable that it be done at atmospheric pressure, from the standpoint of ease of reaction operation. Under these conditions the excess acid serves as a catalyst. An alkylbenzene such as xylene or toluene can be added in a suitable amount as a solvent. The addition of the solvent enables the reaction temperature to be easily controlled. As the reaction proceeds, water which has been formed during the reaction evaporates. The reaction is terminated when an equimolar amount of the water, with respect to the acid, has evaporated. Examples of the catalysts include phosphoric acid, p-toluenesulfonic acid and sulfuric acid. The most preferred catalyst is phosphoric acid, because it enhances the reaction rate and increases the yield of the ester. After the reaction is terminated the reaction product is neutralized with an aqueous alkaline solution and is washed with water to remove the unreacted acid and catalyst. Finally, the reaction product is distilled under reduced pressure to remove water, the solvent, and

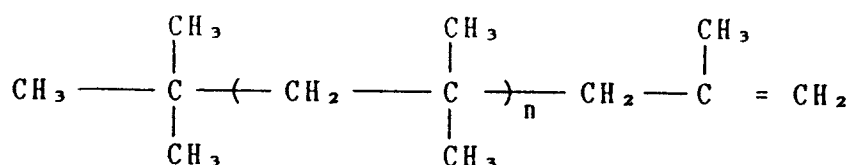
the excess alcohol, thereby obtaining the ester compound of this invention.

The second method of producing the component (i) of this invention comprises esterification of a cyclohexanol compound with a carboxylic acid having 2 to 15 carbon atoms in its main chain. Examples of the cyclohexanol compounds include, besides cyclohexanol, those having an alkyl group with 1 to 8 carbon atoms, e.g., methylcyclohexanol, ethylcyclohexanol, and tert-butylcyclohexanol. Cyclohexanol is particularly preferred. The dicarboxylic acid includes one having 2 to 15 carbon atoms in its main chain, preferably one having 3 to 11 carbon atoms. Examples of the carboxylic acids include acetic, propionic, butyric, lauric, trimethylhexanoic, and tetramethylhexanoic acids. The esterification reaction is conducted in the presence of an excess amount of the acid or alkali. When the esterification reaction is conducted under excess acid conditions, 1 mol of a cyclohexanol compound is reacted with 1 to 2 mol (particularly preferably 1.2 to 1.8 mol) of the acid. The reaction temperature is about 150 to 250°C, preferably 170 to 230°C, and the reaction time is 10 to 40 hr, preferably 15 to 25 hr. Although this esterification reaction may be conducted under either elevated or reduced pressures, it is preferable to do so at atmospheric pressure, from the standpoint of ease of reaction operation. Phosphoric acid, p-toluenesulfonic acid, or sulfuric acid, is used as the catalyst. The most preferable catalyst is phosphoric acid, because it enhances the reaction rate and increases the yield of the ester. An alkylbenzene such as xylene or toluene can be added in a suitable amount as a solvent. The addition of the solvent enables the reaction temperature to be easily controlled. As the reaction proceeds, water which has been formed during the reaction evaporates. The reaction is terminated when an equimolar amount of the water, with respect to the alcohol, has evaporated. The catalyst and the excess acid are removed by neutralizing them with an aqueous alkaline solution and washing them with water. The reaction product is finally distilled, under reduced pressure, to remove the water and solvent, thereby obtaining the ester compound of this invention.

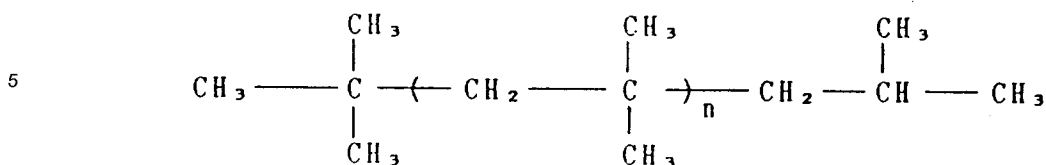
When the esterification reaction is conducted under excess alcohol conditions, 1 mol of the carboxylic acid is reacted with 1 to 2 mol (particularly preferably 1.2 to 1.8 mol) of the cyclohexanol compound. The reaction temperature is about 150 to 250°C, preferably 170 to 230°C, and the reaction time is 10 to 40 hr, preferably 15 to 25 hr. Although the esterification reaction may be conducted under either elevated or reduced pressures, it is preferred that it be conducted at atmospheric pressure, from the standpoint of ease of reaction operation. An alkylbenzene such as xylene or toluene can be added in a suitable amount as a solvent. The addition of the solvent enables the reaction temperature to be easily controlled. As the reaction proceeds, water which has been formed during the reaction evaporates. The reaction is terminated when an equimolar amount of the water, with respect to the carboxylic acid, has evaporated. Examples of the catalyst include phosphoric acid, p-toluenesulfonic acid, and sulfuric acid. The most preferred catalyst is phosphoric acid, because it enhances the reaction rate and increases the yield of the ester. After termination of the reaction, the reaction product is neutralized with an aqueous alkaline solution, and it is then washed with water to remove the catalyst. Finally, the reaction product is distilled under reduced pressure to remove the water, the solvent, and the excess alcohol, thereby obtaining the ester compound of this invention.

Regarding component (ii) the hydrocarbon polymer is a polyolefin, a hydrocarbon polymeric compound having a naphthene ring, or an alkylstyrene polymer, while the polymeric ester is a polymer of an ester compound having a side chain of an alkyl group and/or cyclohexyl ring. Examples of the polyolefin include a poly- α -olefin, an olefin copolymer, a polymer obtained by saturating the unsaturated bonds of one of the above polymers with hydrogen, and a modified polymer obtained by modifying one of the above polymers with a small amount of a modifier. Examples of the modifier include alkylcarboxylic acids, alcohols, and amines. Among the above-mentioned polymers, a poly- α -olefin is particularly preferred.

The poly- α -olefin, which is a preferred component (ii) has either a quaternary carbon atom or a tertiary carbon atom in its main chain, and is a polymer of an α -olefin having 3 to 5 carbon atoms or the hydrogenation product thereof. Examples of the poly- α -olefin include polypropylene, polybutene, polyisobutylene and polypentene and the hydrogenation products thereof. Particularly preferred are polybutene and polyisobutylene and the hydrogenation products thereof. The polyisobutylene is represented by the following structural formula:



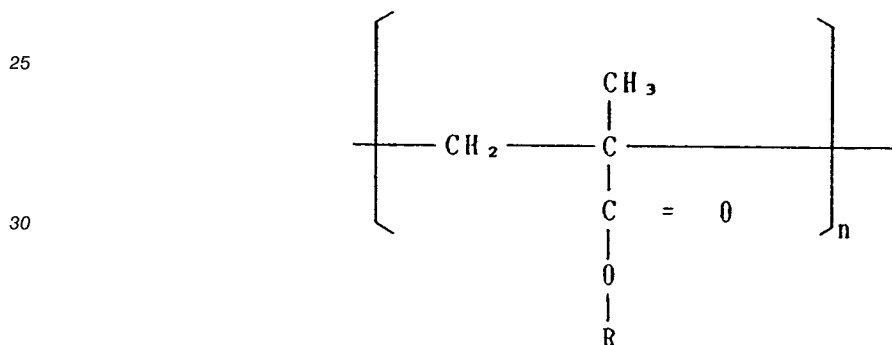
The hydrogenation product of the polyisobutylene is represented by the following structural formula:



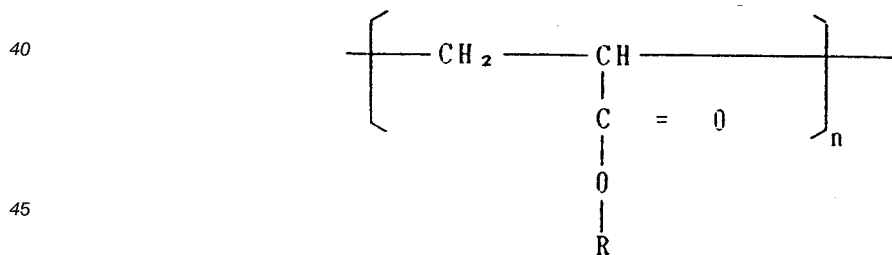
In the above-mentioned formula, the degree of polymerization, n , is 6 to 200.

Although the polybutene and polyisobutylene may be commercially available ones, they may also be produced by conventional polymerization methods. The hydrogenation product thereof is produced by reacting polyisobutylene or the like in the presence of hydrogen. The molecular weight of the poly- α -olefin is preferably in the range of 500 to 10,000, more preferably in the range of 900 to 5,000. The molecular weight can be adjusted by suitable methods such as decomposition of a poly- α -olefin having a high molecular weight and mixing with poly- α -olefins having different molecular weights. The olefin copolymer (OCP) can be obtained by polymerization of two or more olefins selected from among ethylene, propylene, butene, pentene, and styrene. OCP has such a structure that the olefins are irregularly linked with each other, as opposed to a poly- α -olefin, such as polybutene, which has a regular gem-dialkyl structure.

Examples of the defined polymeric ester useful as component (ii) include polymethacrylate or its derivative represented by the following general formula:



wherein R is a hydrocarbon group having 1 to 18 carbon atoms and n is an integer of 100 to 5,000, and polyacrylate or its derivative represented by the general formula:



wherein R is a hydrocarbon group having 1 to 18 carbon atoms and n is an integer of 100 to 5,000. A preferred esteric polymer is polycyclohexyl acrylate or polycyclohexyl methacrylate having the above general formula in which R is a cyclohexyl ring having 6 to 12 carbon atoms and n is an integer of 200 to 250.

Component (i) in this invention, e.g., an ester of 3,5,5-trimethylhexanoic acid with cyclohexanol, exhibits a traction coefficient of 0.080 to 0.090, while component (ii) e.g., polybutene, exhibits a traction coefficient of 0.075 to 0.085.

Both components (i) and (ii) of this invention have a lower traction coefficient than those of commercially available traction fluids. Therefore, they cannot exhibit a high performance if they are used singly or individually in a traction drive device. However, an excellent traction fluid can be obtained by blending

component (i) with 0.1 to 95% by weight, particularly preferably 10 to 70% by weight, of component (ii), which is comprised of a defined hydrocarbon polymer or defined polymeric ester. Specifically, a hydrocarbon group such as an alkyl group of component (ii) cooperates with the cyclohexyl ring in component (i) to exhibit a synergistic effect (in respect to improvement of the traction coefficient). Further, since component (ii) is inexpensive and exhibits excellent viscosity characteristics, a traction fluid exhibiting an enhanced traction coefficient can be economically obtained by blending the component (i) with 0.1 to 95% by weight of the component (ii).

Various additives may also be added to the traction fluid of this invention, depending on its applications. Specifically, when the traction device is subjected to a high temperatures and a large load, at least one additive selected from among an antioxidant, a wear inhibitor, and a corrosion inhibitor, may be added in an amount of 0.01 to 5% by weight.

The term "traction fluid" as used in this invention is intended to mean a fluid for use in devices which transmit a rotational torque through spot contact or line contact, or for use in transmissions having a similar structure. The traction fluid of this invention exhibits a traction coefficient higher than those of conventionally known fluids, i.e., exhibits a traction coefficient 1 to 10 % higher than those of the conventional fluids, although the value varies depending on the viscosity. Therefore, the traction fluid of this invention can be advantageously used for relatively low power drive transmissions, including internal combustion engines of small passenger cars, spinning machines, and food processing machines, as well as for large power drive transmissions such as industrial machines, etc.

The traction fluid of this invention exhibits a remarkably superior traction coefficient compared to conventional fluids. The reason why it does so is not yet fully understood. Basically, however, the reason is believed to reside in the unique molecular structure of the traction fluid of this invention.

The component (i) of the traction fluid of this invention comprises an ester having a cyclohexyl ring in its molecule. The ester linkage brings about an interdipolar force between the molecules. It is believed that this interdipolar force brings the fluid into a stable glassy state under high load conditions, thereby increasing the shearing force. Further, component (ii) of the traction fluid of this invention has a hydrocarbon group such as an alkyl group. Therefore, when the traction device is under high load conditions the cyclohexyl ring in the component (i) is firmly engaged, like gears, with the alkyl group in component (ii), while when the device is released from the load this engagement is quickly broken, thereby causing fluidization.

EXAMPLES 1-18

Ester A₁ of this invention was synthesized by the following method: First, 150.2 g of cyclohexanol and 158.2 g of 3,5,5-trimethylhexanoic acid (wherein the mole ratio of the alcohol to the acid was 1.5:1) were charged into a reactor, and phosphoric acid was added in an amount of 1 % by weight based on the total weight of the reactants. Then the reactor was heated to 180 °C and the contents of the reactor were allowed to react at a temperature in the range of 170 °C to 200 °C under atmospheric pressure. The heating was stopped at a point when the water generated during the reaction amounted to the same number of moles as the above acid.

The reaction mixture was washed with an alkaline solution to remove unreacted compounds, i.e., cyclohexanol, and the phosphoric acid catalyst, from a mixture of a reaction product. i.e., an ester of cyclohexanol with trimethylhexanoic acid, the unreacted compounds, and phosphoric acid, followed by vacuum distillation, thereby isolating a pure diester A₁.

In the same manner as described above, the other esters of this invention, A₂ and A₃, were synthesized using the following materials:

A₂ 3,5,5-trimethyl-1-hexanol and cyclohexane carboxylic acid (no catalyst was used due to the surplus of acid.)

A₃ Lauric acid and cyclohexanol (Phosphoric acid catalyst was used.)

Next, the ester thus produced was blended with polybutene B₁ having an average molecular weight of 900 to 2350, an olefin copolymer (OCP) B₂* or an esteric polymer B₃**, followed by measurement of the traction coefficient. The measurement conditions of the traction coefficient were as follows:

* A copolymer of ethylene with propylene having an average molecular weight of 32.3 x 10⁴

** A polycyclohexylacrylate having an average molecular weight of 5 x 10⁴

Measurement equipment: Soda-type four roller traction test machine.
Testing conditions: a fluid temperature of 20 ° C;
a roller temperature of 30 ° C;
a mean Hertzian pressure of 1.2 GPa; a rolling velocity of 3.6 m/s; and a
percent slipping ratio of 3.0%.

The traction fluid obtained by this invention was found to be remarkably superior in its traction performance to the conventional fluids, as shown in Table 1.

COMPARATIVE EXAMPLES 1 - 5

Traction fluids prepared from A₁ to A₃ components alone and B₁ component alone, and a commercially available traction fluid (Santotrack®), were used as the comparative examples. The traction coefficients of these comparative examples were measured under the same conditions as described above.

The results are shown in Table 1. As can be seen from it, all the comparative examples exhibited traction coefficients 1 to 10% smaller than that of the traction fluid of this invention.

Table 1

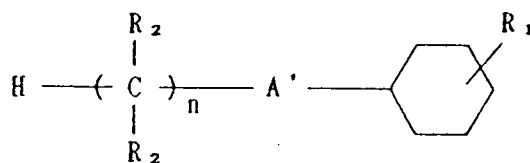
Example	(i)		(ii)		Kinetic		Viscosity index	Traction coefficient
	Loadings wt%	Average H.M.	Loadings wt%	Viscosity(cst)				
				40°C	100°C			
1	A ₁ 75	B ₁ 900	25	16.1	4.04	157	0.095	
2	" 66	" "	34	25.4	5.73	178	0.096	
3	" 82	" 1260	18	13.0	3.82	209	0.091	
4	" 74	" "	26	23.8	5.39	173	0.095	
5	" 66	" "	34	39.7	8.19	187	0.100	
6	" 58	" "	42	101.0	12.98	125	0.096	
7	" 88	" 2350	12	12.8	4.05	249	0.093	
8	" 70	" "	30	91.9	14.38	162	0.100	
9	A ₂ 57	B ₁ 900	43	45.9	8.59	168	0.090	
10	" 70	" 1260	30	39.1	7.18	149	0.089	
11	" 62	" "	38	75.1	10.84	132	0.089	
12	" 74	" 2350	26	50.3	11.30	226	0.090	
13	A ₃ 66	B ₁ 1260	34	64.2	9.31	123	0.091	
14	A ₁ 95	B ₂ 323000	5	10.0	3.13	200	0.087	
15	A ₂ 95	" "	5	9.8	3.27	238	0.078	
16	A ₃ 95	" "	5	16.2	4.45	206	0.083	
17	A ₁ 95	B ₃ 50000	5	11.4	3.52	215	0.092	
18	A ₂ 90	" "	10	12.3	4.01	264	0.089	
Comp. Ex. 1								
1	A ₁ 100	—	0	5.0	1.66	85	0.084	
2	A ₂ "	—	0	5.1	1.77	121	0.076	
3	A ₃ "	—	0	8.5	2.31	78	0.080	
4	—	B ₁ 900	100	11600	240	108	0.081	
5	Santotrack [®]	—	0	13.8	2.99	46	0.087	

The traction fluid of this invention comprises a blend of a compound (component (ii)) in which a cyclohexyl ring is connected to a linear-chain hydrocarbon through an ester linkage, and a specific amount of a defined hydrocarbon polymer or defined polymeric ester. Such a traction fluid not only exhibits an extremely high traction coefficient but is also inexpensive and has excellent viscosity characteristics.

Therefore, the use of the traction fluid of this invention in a power transmission particularly a traction drive device, results in a remarkable increase in shearing force under a high load. This enables the size of the device to be reduced, as well as reducing its costs.

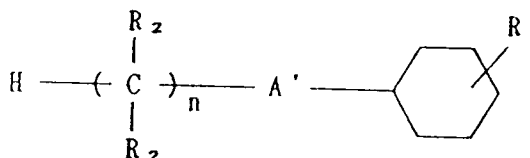
Claims

1. A traction fluid comprising (i) an ester represented by the formula:



wherein A' is an ester linkage of -COO- or -OOC-, n is an integer of 1 to 14, the group R₁ is selected from hydrogen and alkyl groups having 1 to 8 carbon atoms, and each of the groups R₂ which may be the same or different is independently selected from hydrogen and alkyl groups having from 1 to 3 carbon atoms; or a derivative thereof and (ii) from 0.1 to 95% by weight of a polyolefin, a hydrocarbon polymeric compound having a naphthene ring or an alkylstyrene polymer, or a polymer of an ester compound having a side chain of an alkyl group and/or cyclohexyl ring, component (ii) having a traction coefficient of 0.075 to 0.085.

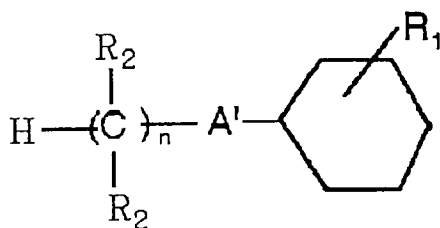
2. A fluid as claimed in claim 1 comprising 10-70% by weight of component (ii).
3. A fluid as claimed in claim 1 or claim 2 wherein component (ii) is a polyolefin.
4. A fluid as claimed in any one of claims 1 to 3 wherein component (ii) is polybutene.
5. A fluid as claimed in any one of claims 1 to 4 wherein component (ii) has an average molecular weight of from 500 to 10,000.
6. A fluid as claimed in any one of claims 1 to 5 wherein the group R₁ of the ester is selected from hydrogen and alkyl groups having from 1 to 4 carbon atoms.
7. A fluid as claimed in any one of claims 1 to 6 wherein n of the ester is an integer of 1 to 10.
8. A fluid as claimed in any one of claims 1 to 7 wherein the group R₂ of the ester is a hydrogen atom or a methyl group.
9. A traction fluid as claimed in any one of claims 1 to 8 further comprising at least one additive selected from an antioxidant, a wear inhibitor and a corrosion inhibitor, in an amount of 0.01 to 5% by weight.
10. Use of an ester represented by the formula:



wherein A' is an ester linkage of -COO- or -OOC-, n is an integer of 1 to 14, the group R₁ is selected from hydrogen and alkyl groups having 1 to 8 carbon atoms, and each of the groups R₂ which may be the same or different is independently selected from hydrogen and alkyl groups having from 1 to 3 carbon atoms; or a derivative thereof together with a component selected from polyolefin, a hydrocarbon polymeric compound having a naphthene ring or an alkylstyrene polymer, or a polymer of an ester compound having a side chain of an alkyl group and/or cyclohexyl ring, said component having a traction coefficient of 0.075 to 0.085, as a base oil for a traction fluid.

Patentansprüche

1. Antriebsflüssigkeit, die (i) einen Ester mit der Formel



in der A' eine Esterbindung -COO- oder -OOC- ist, n eine ganze Zahl von 1 bis 14 ist, die Gruppe R₁ unabhängig ausgewählt ist aus Wasserstoff und Alkylgruppen mit 1 bis 8 Kohlenstoffatomen, und jede der Gruppen R₂, die gleich oder verschieden sein können, unabhängig ausgewählt ist aus Wasserstoff und Alkylgruppen mit 1 bis 3 Kohlenstoffatomen; oder ein Derivat hiervon und (ii) 0,1 bis 95 Gew.% eines Polyolefins, einer Kohlenwasserstoffpolymerverbindung mit einem Naphthenring oder eines Alkylstyrolpolymers oder eines Polymers einer Esterverbindung, das als Seitenkette eine Alkylgruppe und/oder einen Cyclohexylring aufweist, umfaßt, wobei Komponente (ii) einen Traktionskoeffizienten von 0,075 bis 0,085 hat.

2. Flüssigkeit nach Anspruch 1, die 10 bis 70 Gew.% Komponente (ii) umfaßt.

3. Flüssigkeit nach Anspruch 1 oder Anspruch 2, bei der Komponente (ii) ein Polyolefin ist.

4. Flüssigkeit nach einem der Ansprüche 1 bis 3, bei der Komponente (ii) Polybuten ist.

5. Flüssigkeit nach einem der Ansprüche 1 bis 4, bei der Komponente (ii) ein durchschnittliches Molekulargewicht von 500 bis 10 000 hat.

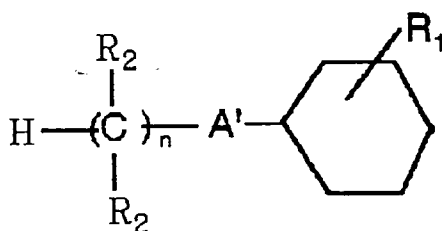
6. Flüssigkeit nach einem der Ansprüche 1 bis 5, bei der die Gruppe R₁ des Esters ausgewählt ist aus Wasserstoff und Alkylgruppen mit 1 bis 4 Kohlenstoffatomen.

7. Flüssigkeit nach einem der Ansprüche 1 bis 6, bei der n in dem Esters eine ganze Zahl von 1 bis 10 ist.

8. Flüssigkeit nach einem der Ansprüche 1 bis 7, bei der die Gruppe R₂ des Esters ein Wasserstoffatom oder eine Methylgruppe ist.

9. Antriebsflüssigkeit nach einem der Ansprüche 1 bis 8, die außerdem mindestens ein Additiv ausgewählt aus der Gruppe bestehend aus einem Antioxidans, einem Verschleißinhibitor und einem Korrosionsinhibitor in einer Menge von 0,01 bis 5 Gew.% umfaßt.

10. Verwendung eines Esters mit der Formel

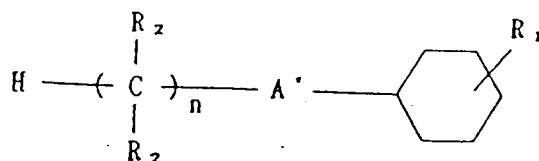


in der A' eine Esterbindung -COO- oder -OOC- ist, n eine ganze Zahl von 1 bis 14 ist, die Gruppe R₁ unabhängig ausgewählt ist aus Wasserstoff und Alkylgruppen mit 1 bis 8 Kohlenstoffatomen, und jede

der Gruppen R_2 , die gleich oder verschieden sein können, unabhängig ausgewählt ist aus Wasserstoff und Alkylgruppen mit 1 bis 3 Kohlenstoffatomen; oder eines Derivats hiervon zusammen mit einer Komponente ausgewählt aus Polyolefin, einer Kohlenwasserstoffpolymerverbindung mit einem Naphthenring oder einem Alkylstyrolpolymer oder einem Polymer einer Esterverbindung, das als Seitenkette eine Alkylgruppe und/oder einen Cyclohexylring aufweist, wobei die Komponente einen Traktionskoeffizienten von 0,075 bis 0,085 hat, als ein Grundöl für eine Antriebsflüssigkeit.

Revendications

1. Fluide de traction comprenant (i) un ester représenté par la formule :



dans laquelle A' représente une liaison ester du groupe $-\text{COO}-$ ou $-\text{OOC}-$, n représente un nombre entier de 1 à 14, le groupe R_1 est choisi entre l'hydrogène et des groupes alkyle ayant 1 à 8 atomes de carbone, et chacun des groupes R_2 , qui peuvent être identiques ou différents, est choisi indépendamment entre l'hydrogène et des groupes alkyle ayant 1 à 3 atomes de carbone, ou un de ses dérivés, et (ii) 0,1 à 95 % en poids d'une polyoléfine, d'un composé polymérique hydrocarboné ayant un noyau naphène ou d'un polymère d'alkylstyrène, ou bien d'un polymère d'un ester ayant une chaîne latérale formée d'un groupe alkyle et/ou d'un noyau cyclohexyle, le constituant (ii) ayant un coefficient de traction de 0,075 0,085.

2. Fluide suivant la revendication 1, comprenant 10 à 70 % en poids de constituant (ii).

3. Fluide suivant la revendication 1 ou la revendication 2, dans lequel le constituant (ii) est une polyoléfine.

4. Fluide suivant l'une quelconque des revendications 1 à 3, dans lequel le constituant (ii) est un polybutène.

5. Fluide suivant l'une quelconque des revendications 1 à 4, dans lequel le constituant (ii) possède un poids moléculaire moyen de 500 à 10 000.

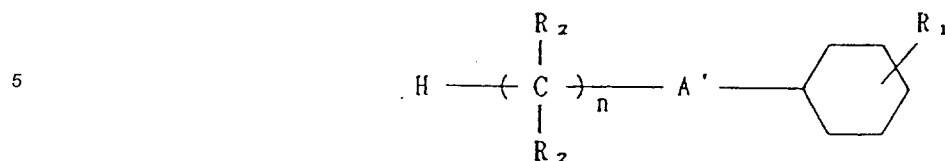
6. Fluide suivant l'une quelconque des revendications 1 à 5, dans lequel le groupe R_1 de l'ester est choisi entre l'hydrogène et des groupes alkyle ayant 1 à 4 atomes de carbone.

7. Fluide suivant l'une quelconque des revendications 1 à 6, dans lequel l'indice n de l'ester est un nombre entier de 1 à 10.

8. Fluide suivant l'une quelconque des revendications 1 à 7, dans lequel le groupe R_2 de l'ester est un atome d'hydrogène ou un groupe méthyle.

9. Fluide de traction suivant l'une quelconque des revendications 1 à 8, comprenant en outre au moins un additif choisi entre un antioxydant, un agent anti-usure et un inhibiteur de corrosion, en une quantité de 0,01 à 5 % en poids.

10. Utilisation d'un ester représenté par la formule :



10 dans laquelle A' représente une liaison ester d'un groupe -COO-ou -OOC-, n représente un nombre entier de 1 à 14, le groupe R₁ est choisi entre l'hydrogène et des groupes alkyle ayant 1 à 8 atomes de carbone, et chacun des groupes R₂, qui peuvent être identiques ou différents, est choisi indépendamment entre l'hydrogène et des groupes alkyle ayant 1 à 3 atomes de carbone ; ou d'un de ses dérivés conjointement avec un constituant choisi entre une polyoléfine, un composé polymérique hydrocarboné ayant un noyau naphène ou un polymère d'alkylstyrène, ou bien un polymère d'un ester ayant une chaîne latérale formée d'un groupe alkyle et/ou d'un noyau cyclohexyle, ledit constituant ayant un coefficient de traction de 0,075 0,085, comme huile de base pour fluide de traction.

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