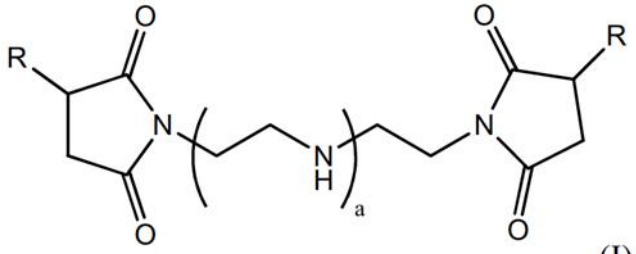
CLAIMS

1. A method for improving the dynamic friction performance of a wet clutch, said method comprising lubricating said clutch with a power transmission fluid comprising a major amount of a lubricating oil and a minor amount of an additive composition, said additive composition comprising:

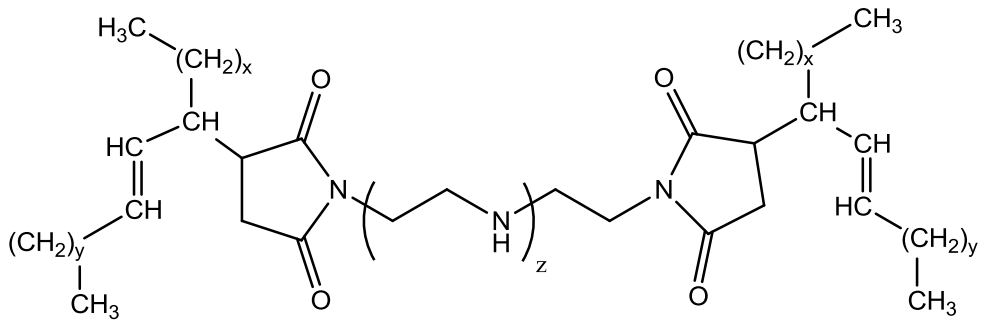
(i) 0.1 to 10.0 mass percent, per mass of the fluid of a compound of structure (I):



(I)

wherein a is an integer from 1 to 10 and R is a hydrocarbon group made by the metallocene-catalysed polymerisation of an alphaolefin feedstock, said feedstock being 1-octene, 1–decene, 1-dodecene or any mixture thereof;

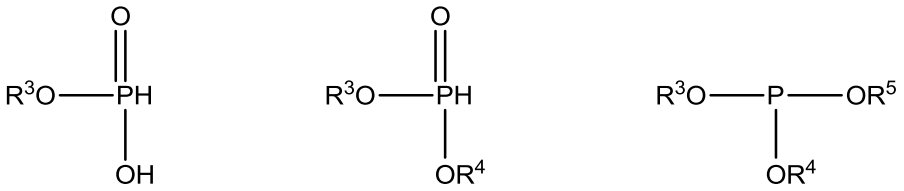
(ii) 0.1 to 10.0 mass percent, per mass of the fluid of a friction modifier of structure (II):

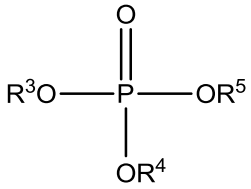


(II)

wherein x + y is from 8 to 15, and z = 0 or an integer from 1 to 5; and

(iii) an oil-soluble phosphorus compound comprising one or more compounds of the structures:





wherein groups R^3, R^4 and R^5 may be the same or different hydrocarbyl groups, or aryl groups, or linear alkyl groups optionally containing a thioether linkage and optionally where one or more of the oxygen atoms in the above structures may be replaced by a sulfur atom, in an amount such as to provide the power transmitting fluid with from 10 to 1000 parts per million by mass (ppm) of elemental phosphorus, per mass of the fluid.

2. A method according to claim 1 wherein the wet clutch is a slipping torque convertor clutch.

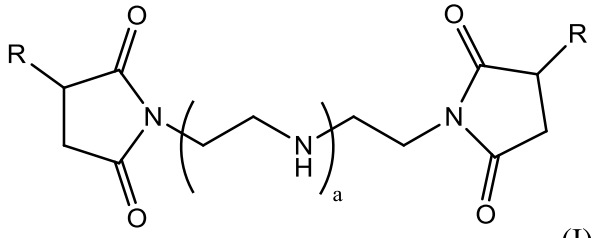
3. A method according to claim 1 or claim 2 wherein groups R^3 and R^4 and R^5 are linear alkyl groups optionally containing a thioether linkage.

4. A method according to claim 3 wherein groups R^3 and R^4 and R^5 are each independently selected from 3-thio-heptyl, 3-thio-nonyl, 3-thio-undecyl, 3-thio-tridecyl, 5-thio-hexadecyl and 8-thio-octadecyl.

5. A method according to any preceding claim wherein said additive composition further comprises an ashless dispersant (iv).

6. A method according to claim 5 wherein said ashless dispersant (iv) comprises one or more of polyisobutenyl succinimide, polyisobutenyl succinamide, mixed ester/amide of a polyisobutenyl-substituted succinic acid, hydroxyester of a polyisobutenyl-substituted succinic acid, Mannich condensation product of one or more hydrocarbyl-substituted phenols, formaldehyde and one or more polyamines, or a mixture thereof.

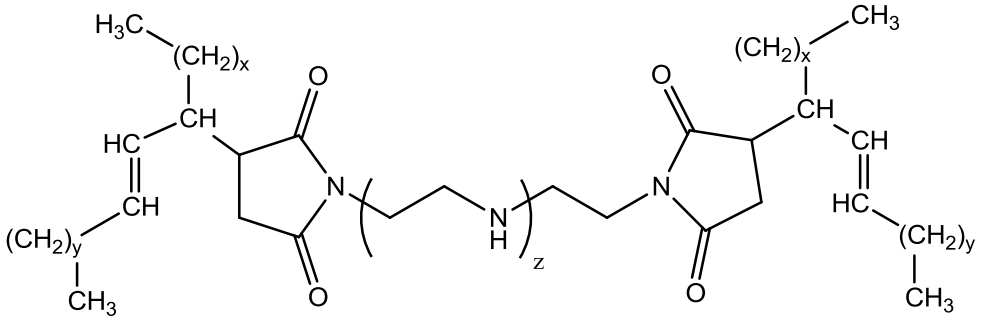
7. A transmission fluid comprising a major amount of a lubricating oil and a minor amount of an additive composition, wherein the additive composition comprises (i) 0.1 to 10.0 mass percent of a compound of structure (I):



(I)

wherein a is an integer from 1 to 10 and R is a hydrocarbon group made by the metallocene-catalysed polymerisation of an alphaolefin feedstock, said feedstock being 1-octene, 1–decene, 1-dodecene or any mixture thereof;

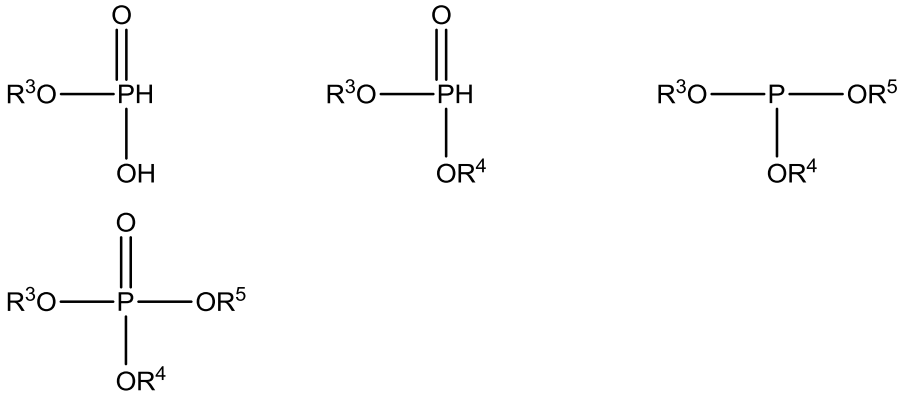
(ii) 0.1 to 10.0 mass percent, of a friction modifier of structure (II):



(II)

wherein x + y is from 8 to 15, and z = 0 or an integer from 1 to 5; and

(iii) an oil-soluble phosphorus compound comprising one or more compounds of the structures:



wherein groups R^3, R^4 and R^5 may be the same or different hydrocarbyl groups, or aryl groups and optionally where one or more of the oxygen atoms in the above structures may be replaced by a sulfur atom, in an amount such as to provide the

power transmitting fluid with from 10 to 1000 parts per million by mass (ppm) of elemental phosphorus, per mass of the fluid.

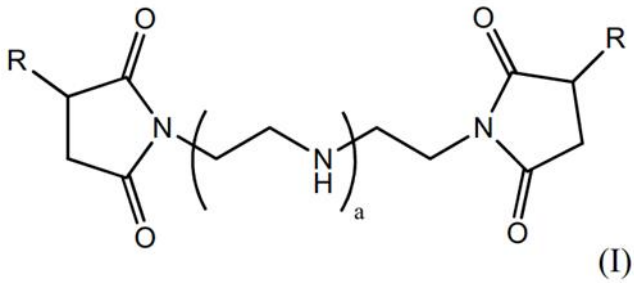
8. A transmission fluid according to claim 7 wherein groups R^3 and R^4 and R^5 are linear alkyl groups optionally containing a thioether linkage.

9. A transmission fluid according to claim 8 wherein groups R^3 and R^4 and R^5 are each independently selected from 3-thio-heptyl, 3-thio-nonyl, 3-thio-undecyl, 3-thio-tridecyl, 5-thio-hexadecyl and 8-thio-octadecyl.

10. A transmission fluid according to any of claims 7 to 9 wherein said additive composition further comprises an ashless dispersant (iv).

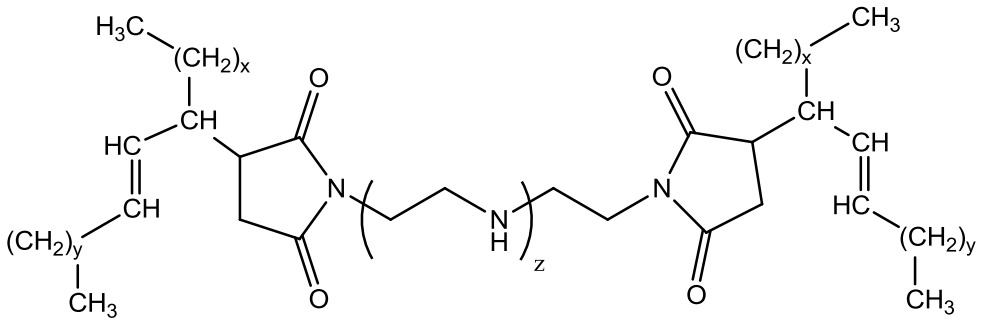
11. A transmission fluid according to claim 10 wherein said ashless dispersant (iv) comprises one or more of polyisobutenyl succinimide, polyisobutenyl succinamide, mixed ester/amide of a polyisobutenyl-substituted succinic acid, hydroxyester of a polyisobutenyl-substituted succinic acid, Mannich condensation product of one or more hydrocarbyl-substituted phenols, formaldehyde and one or more polyamines, or a mixture thereof.

12. The use of a transmission fluid comprising a major amount of a lubricating oil and a minor amount of an additive composition, the additive composition comprising:
(i) 0.1 to 10.0 mass percent of a compound of structure (I):



(I)

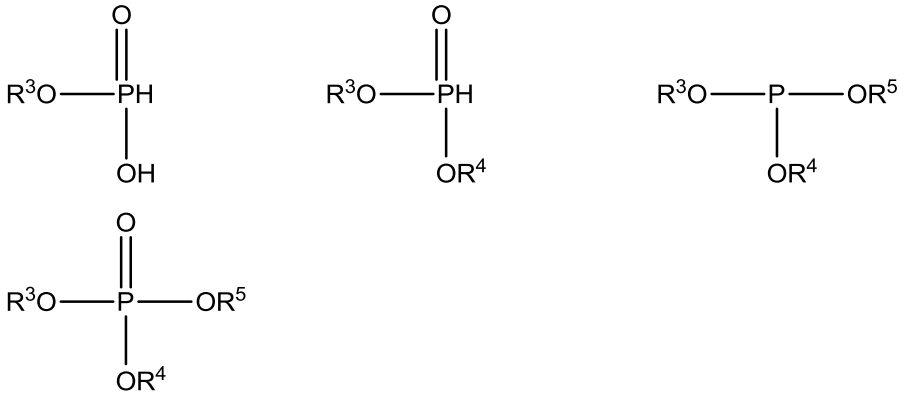
wherein a is an integer from 1 to 10 and R is a hydrocarbon group made by the metallocene-catalysed polymerisation of an alphaolefin feedstock, said feedstock being 1-octene, 1–decene, 1-dodecene or any mixture thereof;
(ii) 0.1 to 10.0 mass percent of a friction modifier of structure (II):



(II)

wherein x + y is from 8 to 15, and z = 0 or an integer from 1 to 5; and

(iii) an oil-soluble phosphorus compound comprising one or more compounds of the structures:



wherein groups R^3, R^4 and R^5 may be the same or different hydrocarbyl groups, or aryl groups, or linear alkyl groups optionally containing a thioether linkage and optionally where one or more of the oxygen atoms in the above structures may be replaced by a sulfur atom, in an amount such as to provide the power transmitting fluid with from 10 to 1000 parts per million by mass (ppm) of elemental phosphorus, per mass of the fluid;

to improve the dynamic friction performance of a wet clutch lubricated by the transmission fluid.

13. The use according to claim 12 wherein said additive composition further comprises an ashless dispersant (iv).