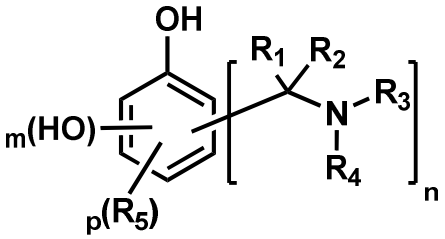
CLAIMS

1. A method for preventing or reducing low speed pre-ignition events in a spark-ignited internal combustion engine, the method comprising:

supplying to the engine the lubricant composition comprising a primary additive having a structure given by



or a salt thereof;

wherein R_1 and R_2 are independently H, C_1-C_{20} hydrocarbyl group, carboxyl group, ester, amide, ketone, ether, or hydroxyl group;

wherein R_3 and R_4 are independently H, C_1-C_{20} hydrocarbyl group, carboxyl group, ester, amide, ketone, ether, amino, or hydroxyl group or wherein R_3 and R_4 are part of a cyclic group;

wherein R_5 is C_1-C_{100} hydrocarbyl group, carboxyl group, ether, or hydroxyl group;

wherein p is 0 to 2, n is 1 to 5, m is 0 to 2, and p+n+m is less than 6; and wherein the lubricant composition further comprises a secondary additive selected from an acid, phenol, 1, 3 dicarbonyl, hydroxyamide, antioxidant, salicylate, or amidine.

2. The method of claim 1, wherein the primary additive is 2,4,6-tris(dimethyl aminomethyl)phenol, 2-[(dimethylamino)methyl]phenol, 4-(tert-butyl)-2,6-bis((dimethylamino)methyl)phenol, or 2-(tert-butyl)-4,6-bis((dimethylamino)methyl)phenol.

3. The method of claim 1, wherein the secondary additive is 2-ethylhexanoic acid, or 1,8-diazabicyclo[5.4.0]-undeca-7-ene.

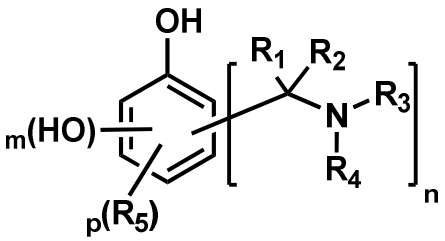
4. The method of claim 1, R_1 and R_2 are both hydrogen.

5. The method of claim 1, wherein at least one of R_3 and R4 is a methyl group.

6. The method of claim 1, wherein n is 2 or 3.

7. A method for preventing or reducing low speed pre-ignition events in a spark-ignited internal combustion engine, the method comprising:

lubricating the engine the lubricant composition comprising a phenolic amine having a structure given by



or a salt there of;

wherein R_1 and R_2 are independently H, C_1-C_{20} hydrocarbyl group, carboxyl group, ester, amide, ketone, ether, or hydroxyl group;

wherein R_3 and R_4 are independently H, C_1-C_{20} hydrocarbyl group, carboxyl group, ester, amide, ketone, ether, amino, or hydroxyl group or wherein R_3 and R_4 are part of a cyclic group;

wherein R_5 is C_1-C_{100} hydrocarbyl group, carboxyl group, ether, or hydroxyl group;

wherein p is 0 to 2, n is 1 to 5, m is 0 to 2, and p+n+m is less than 6; and

a second additive or a salt thereof, wherein the second additive is an acid, phenol, 1, 3 dicarbonyl, hydroxyamide, antioxidant, salicylate, or amidine.

8. The method of claim 7, wherein the phenolic amine is 2,4,6-tris(dimethyl aminomethyl)phenol, 2-[(dimethylamino)methyl]phenol, 4-(tert-butyl)-2,6-bis((dimethylamino)methyl)phenol, or 2-(tert-butyl)-4,6-bis((dimethylamino)methyl)phenol.

9. The method of claim 7, wherein the secondary additive is 2-ethylhexanoic acid, or 1,8-diazabicyclo[5.4.0]-undeca-7-ene.

10. The method of claim 7, R_1 and R_2 are both hydrogen.

11. The method of claim 7, wherein at least one of R_3 and R_4 is a methyl group.

12. The method of claim 7, wherein n is 2 or 3.