typically addressed by increasing the amount of detergent-containing trunk piston engine lubricating oil additive packages.

**[0004]** Several attempts have been made to develop a lubricating oil composition having improved performance within trunk piston engines operating on heavy fuel oils. For example, EP 1154012 discloses a dispersant-free lubricating oil composition comprising an oil of lubricating viscosity, an overbased metal detergent, and an antiwear additive, wherein the composition can contain small amounts of a dispersant provided that the composition does not substantially demonstrate the dispersancy effect of the component.

**[0005]** Similarly, EP 1209218 discloses a dispersant-free lubricating oil composition comprising an oil of lubricating viscosity, an overbased metal detergent, and an antiwear additive, where the composition can contain less than or equal to 1 mass % of a dispersant.

**[0006]** U.S. Patent Application Publication No. 20090093387 ("the '387 application") discloses a lubricating oil composition containing (a) a Group II basestock, and (b) a neutral or overbased metal hydrocarbyl-substituted hydroxybenzoate detergent having a basicity index of less than 2. The '387 application further discloses that the neutral or overbased metal salicylate detergent having a basicity index of less than 2 improves asphaltene dispersancy in Group II basestocks.

**[0007]** Accordingly, it would be desirable to provide an improved trunk piston engine lubricating oil composition which exhibits improved heavy fuel oil compatibility.

## SUMMARY OF THE DISCLOSURE~~INVENTION~~

**[0008]** In accordance with one embodiment of the present disclosure~~invention~~, a trunk piston engine lubricating oil composition is provided comprising (a) a major amount of a basestock selected from the group consisting of at least one Group III basestock, at least one Group IV basestock and mixtures thereof; (b) at least one detergent additive; and (c) at least one

dispersant additive; wherein the concentration of the at least one dispersant additive in the trunk piston engine lubricating oil composition is at least about 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition.

**[0008a]** In another embodiment, there is provided a trunk piston engine lubricating oil composition comprising:

(a) a major amount of a basestock selected from the group consisting of at least one Group III basestock, at least one Group IV basestock and mixtures thereof;

(b) at least one detergent additive; and

(c) at least one dispersant additive;

wherein the concentration of the at least one dispersant additive in the trunk piston engine lubricating oil composition is at least 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition;

wherein the trunk piston engine lubricating oil composition has a total base number of at least 12;

wherein the at least one detergent additive comprises at least one salt of an alkyl-substituted hydroxybenzoic acid; and

wherein the trunk piston engine lubricating oil composition has a soap content of less than 250mmol/kg.

**[0009]** In accordance with a second embodiment of the present disclosure~~invention~~, a trunk piston engine lubricating oil composition is provided comprising (a) a major amount of at least one Group III basestock having a paraffinic carbon content of at least about 70 % as determined by test method ASTM D 3238-95 (2005); (b) at least one detergent additive; and (c) at least one dispersant additive; wherein the concentration of the at least one dispersant additive in the trunk piston engine lubricating oil composition is at least about 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition.

[0010] In accordance with a third embodiment of the present disclosure~~invention~~, there is provided a method for reducing black sludge and deposit formation in a trunk piston engine, comprising lubricating the trunk piston engine with a trunk piston engine lubricating oil composition comprising (a) a major amount of a basestock selected from the group consisting of at least one Group III basestock, at least one Group IV basestock and mixtures thereof; (b) at least one detergent additive; and (c) at least one dispersant additive; wherein the concentration of the at least one dispersant additive in the trunk piston engine lubricating oil composition is at least about 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition.

[0010a] In another embodiment, there is provided a method for reducing black sludge and deposit formation in a trunk piston engine, the method comprising lubricating the trunk piston engine with a trunk piston engine lubricating oil composition as defined herein.

[0011] In accordance with a fourth embodiment of the present disclosure~~invention~~, there is provided a method for operating a trunk piston engine comprising lubricating the trunk piston engine with a trunk piston engine lubricating oil composition is provided comprising (a) a major amount of a basestock selected from the group consisting of at least one Group III basestock, at least one Group IV basestock and mixtures thereof; (b) at least one detergent additive; and (c) at least one dispersant additive; wherein the concentration of the at least one

dispersant additive in the trunk piston engine lubricating oil composition is at least about 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition.

[0011a] In another embodiment, there is provided the use of the trunk piston engine lubricating oil composition as defined herein for reducing black sludge and deposit formation in a trunk piston engine.

[0012] It has been surprisingly found that the use of at least about 0.1 wt. % on an actives basis of at least one dispersant additive in a trunk piston engine lubricating oil composition containing at least one Group III basestock and/or at least one Group IV basestock decreases deposits due to asphaltene deposition, in particular in trunk piston engine oils based on alkyl-substituted hydroxybenzoate detergent chemistry. The decrease in deposits appears to increase with increasing dispersant concentration even at high dispersant concentrations, in contrast with what has been seen in Group I and II basestocks.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The present invention is directed to a trunk piston engine lubricating oil composition is provided comprising (a) a major amount of a basestock selected from the group consisting of at least one Group III basestock, at least one Group IV basestock and mixtures thereof; (b) at least one detergent additive; and (c) at least one dispersant additive; wherein the concentration of the at least one dispersant additive in the trunk piston engine lubricating oil composition is at least about 0.1 wt. % on an actives basis, based on the total weight of the lubricating oil composition.

[0014] To facilitate the understanding of the subject matter disclosed herein, a number of terms, abbreviations or other shorthand as used herein are defined below. Any term, abbreviation or shorthand not defined is understood to have the ordinary meaning used by a skilled artisan contemporaneous with the submission of this application.

[0015] The term "major amount" as used herein refers to a concentration of the basestock within the lubricating oil composition of at least about 40 wt. %. In one embodiment, the term "major amount" refers to a concentration of the basestock within the