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Villacampa

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[54] **FUEL AND OIL ADDITIVE**

[76] Inventor: **Eugenio G. Villacampa,** Av. Morelos No. 31-203, Mexico 1, D.F., Mexico

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Primary Examiner—Daniel E. Wyman
Assistant Examiner—Y. Harris-Smith
Attorney, Agent, or Firm—Edward A. Sokolski

[57] **ABSTRACT**

A fuel and oil additive comprising a composition of matter containing napthalene, camphor, toluene, benzyl alcohol, and gasoline. The composition may additionally contain a small amount of a lower alcohol such as isopropyl alcohol or ethyl alcohol.

5 Claims, No Drawings

FUEL AND OIL ADDITIVE

Innumerable compositions have been formulated to improve the performance of gasoline engines internal combustion engines. Separate compositions have been developed to improve performance of diesel engines. Different compositions have also existed for fuel oil additives. In each of the aforegoing three classes, separate compositions of matter have been required for each category. In other words, generally the same composition that was used as a gasoline additive to improve performance of the engine could not also be added to the oil to achieve improved performances as a result thereof. Generally, fuel and oil additive compositions achieved improved performance in one single category. For example, the horsepower of an engine might be increased through the addition of a given additive to a gasoline burning internal combustion engine, but the fuel consumption of the engine would not be reduced. Alternatively, an additive might be utilized to reduce the smoke emission of an engine, yet performance of the engine would not be affected. To date, there is no known additive for internal combustion engines that will serve to simultaneously reduce the fuel consumption, increase the horsepower and reduce the noxious exhaust gases such as reduce the hydrocarbon output, carbon monoxide production and nitrous oxide in the exhaust gases from the engine. Further, there is no known additive that will achieve the foregoing when added to fuel and then when added to an oil for internal combustion engine will effect a reduction in the oil consumption of the engine.

With the present emphasis on reduction of smog and thus the production of noxious gases from internal combustion engines, it is important that additives utilized in such engines do not contribute to the additional production of such gases. In fact, it is obviously preferred that an additive serve to reduce these gases. Particular gases of concern are hydrocarbons, carbon monoxide and nitrous oxide.

Prior to the herein invention both camphor and naphthalene had been added to gasoline in order to increase the performance of internal combustion engines. Though improved results are obtained through the addition of either camphor or naphthalene alone, it is well known that those materials cannot be continuously used in an engine, since deleterious results are found.

Naphthalene and camphor are both highly unsaturated hydrocarbons which possess higher boiling points and lower flame propagation rates than the benzene series of hydrocarbons which comprise the principal ingredients of commercial grade gasolines. However, both possess poor burning characteristics, resulting in heavy smoking in an open flame and in sooty exhaust when used in internal combustion engines. Addition of either, or both, naphthalene or camphor to gasoline in sufficient quantities to affect the flame propagation rate of the gasoline (i.e., increase the effective octane of the gasoline) also results in a reduction in combustion efficiency and a corresponding increase in the quantity of unburned carbon; conversely, reducing the quantity of either or both to a point where excess unburned carbon was not produced would result in so little of either or both naphthalene or camphor being present as to cause no significant change in the flame propagation rate. In view of the foregoing, camphor has never been successfully added on a continuous basis to

gasoline compositions in operating automobile or other internal combustion engines. Thus, one of the objects of the herein invention is to provide means for obtaining the beneficial performance results through the addition of camphor and naphthalene yet obtain none of the detrimental effects heretofore resulting from addition of these agents in the past.

Thus, an object of this invention is to provide a novel composition useful as an additive to both fuels and oils to obtain improved performance and other properties in the operation of internal combustsion engines.

Another object of this invention is to provide a novel composition of matter which when added to fuel will reduce the production of various noxious gases emitted from the engine.

A still further object of this invention is to provide a novel composition of matter which will provide significantly improved performance in internal combustion engines when in small proportions to the fuels for the engines.

The above and other objects of this invention will be further apparent from the following detailed description and examples.

Briefly, the herein invention comprises a composition of matter containing from 16 to 19.5 weight percent naphthalene, 6 to 8.7 weight percent camphor, 28 to 42 weight percent of a gasoline fraction, 36 to 45 weight percent toluene, and 1.8 to 3.0 weight percent benzyl alcohol. The composition may further contain from 0 to 1.0 weight percent of a lower alkyl alcohol of 1 to 8 carbon atoms such as methyl alcohol, or isopropyl alcohol or the like. It has been found that when the above composition is added to fuel, there is a noticeable increase in the horsepower of the internal combustion engine utilizing the fuel. Further, there is a reduction in the fuel oil consumption rate. Additionally, as will be seen from specific examples, there is a reduction in the hydrocarbon output, carbon monoxide and nitrous oxide production from such internal combustion engines having the additive present in small amounts. When added to the oil utilized in the engines, a noticeable decrease in fuel oil consumption is achieved. Test data have shown that the additive can provide improved results with both gasoline engines and diesel engines. It has particularly been visually observed that smoke producing engines have the production of smoke greatly reduced upon the addition of the aforegoing composition to the fuel used therein. It is believed that the invention will be further understood from the following description and examples.

Many of the individual components utilized in the herein additive composition of this invention have been previously used alone or in various combinations as additives for fuels and the like. Unexpectedly, however, it has been found when the various particular materials comprising the composition of this invention are combined and formulated according to the method to be described herein, the resulting composition provides results heretofore not obtainable when these materials are used alone or in combination with other materials than those used herein. The additive of the herein invention is a liquid which can be readily dissolved in a fuel or oil. However, two of the components of the additive of the composition are normally solid and thus must be suitably dissolved into the composition of the invention. These two components are naphthalene and camphor which are normally furnished as crystalline materials. Naphthalene is present in an amount from 16

to 19.5 weight percent of the composition, preferably containing from 18.5 to 18.75 weight percent, while the camphor is present in a range of 6 to 8.7 weight percent and preferably from 7.0 to 7.25 weight percent. The naphthalene and camphor crystals are first heated in a suitable container such as heated jacketed container until the mixture is liquid. This occurs at a temperature between 175° and 210°F, depending upon the purity of the components used. Thus, by initially heating the two solid components to a liquid state they will more readily go into solution and be intimately and properly mixed with the remaining components of the composition.

In a separate container, the remaining ingredients of the composition are mixed. These include the gasoline fraction in an amount ranging from 28 to 42 weight percent, and preferably from 33 to 37 weight percent, toluene in the amount ranging from 36 to 45 weight percent and preferably 38 to 42 weight percent, and benzyl alcohol in an amount ranging from 1.8 to 3.0 weight percent and preferably 2 to 3 weight percent. In a container having a suitable mixing means such as a paddle or other stirrer, there is first disposed the gasoline fraction. To this is then added the toluene in an amount required, while stirring. The toluene is added to the gasoline because mixing is continued for a period of time sufficient to assure that the two components are intimately mixed with each other.

Since toluene is highly explosive and quite dangerous to handle when present alone, it is desirable to achieve a good dispersion of the material in the gasoline whereby the explosion hazard is substantially reduced and thus the safety of the process is increased. To the mixture of gasoline and toluene there is then added the required amount of benzyl alcohol and stirring is continued. This is then followed by adding the heated liquid solids to form the resulting composition of the invention. Mixing then continues for a short period of time on the order of 5 to 15 minutes to assure good dispersion of the components. It has been found that the resulting composition should not be utilized for approximately a 24 hour period after the mixing in order to achieve the most beneficial results thereof. It is possible that there is perhaps an interaction between the individual components during this period of time which will go to completion and provide the desired results used as an additive.

In addition to adding the benzyl alcohol, a small amount ranging from 0 up to 1.0 weight percent of a lower alcohol, such as ethyl or isopropyl alcohol, can be further added to the composition. This can be done at the same time the benzyl alcohol is added. The lower alcohol is believed to further aid in the solvency of the components with each other though sufficiently good results are obtained when this material is not present.

The gasoline fraction utilized can vary widely so long as it is suitably for the operation of an internal combustion engine. The gasoline fraction should meet the normal requirements for this material in that it should be composed of hydrocarbons with boiling points ranging from 60° to 200°C, including straight chain and branched chain paraffins, naphthenes and aromatic hydrocarbons. It has been found that normal gasoline fractions can be utilized, or the gasoline compositions that are particularly suited and designed for use in automobiles such as delivered from the gasoline pump at a fuel station. Such commercial gasolines will contain small amounts of various additives such as lead tetraethyl, antioxidants, corrosion inhibitors and the like.

It should be pointed out that various trade name products and the like not referred to as gasolines yet are suitable as a gasoline component herein, since they meet the definition of the gasoline, having a proper boiling point range, vapor pressure and performance characteristics when utilized in internal combustion engines. The usual source of gasoline is the third fraction obtained in the distillation of petroleum and crude oil. Further, gasoline is obtained by cracking, polymerization and other chemical reactions through which the naturally occuring petroleum hydrocarbons are converted to those that have superior fuel properties.

In order to best obtain the results of this invention, a minimum amount of the additive composition should be present in the fuel or oil. When utilized in a gasoline internal combustion engine, the additive composition should be present in at least an amount equivalent to 0.50 to 5 parts by volume of the additive to 5000 parts of the gasoline fuel. Surprisingly, it has been found that increasing the amount of the additive above the foregoing range does not in any way deleteriously affect the performance of the engine or the surfaces of the engine which the additive contacts. Tests in fact indicate that if an engine ran entirely on the additive of this invention no adverse effects are obtained.

In a diesel engine, the additive should be preferably present in an amount ranging from 1 to 5 parts by volume of the additive to 4000 parts of the diesel fuel. Up to 40 parts of the additive to 9000 parts of diesel fuel is possible. When utilized as an oil additive, the composition should preferably be present in an amount ranging from 5 to 30 parts by volume of the additive to 1000 parts of the oil. Since a basic component of the herein additive is gasoline, it should be apparent that there is a limit on the amount that can be used in both the diesel fuel and oil applications. Thus a diesel fuel can contain up to 1.0 volume percent of the additive and oil can have up to 3 volume percent present.

The additive of the invention can be added to for example the gas tank of an automobile concurrent with the filling of the tank with gasoline, or it can be added of course directly to the gasoline so that it will be injected into the car from the pump. The same of course applies for both the diesel and fuel aspects and the oil aspects of the invention in that the additive can be either added to the automobile or vehicle separately or integrally mixed in with the diesel oil or fuel. It is believed that the invention will be further understood from the following examples

EXAMPLE I

120 liters of the additive of the herein invention were formulated. In a first vessel which comprised a jacketed container heated by circulating hot water, there was added 18.4 kilograms of naphthalene crystals and 7.0 kilograms of camphor crystals. The hot water had a temperature of 200°F. In a short period of time the heated crystals liquified. In a separate vessel, there was first added 46 liters of gasoline. To the gasoline there was then added 46 liters of toluene. After the addition of the toluene, the mixture was then stirred. There was then added to the mixture two liters of benzyl alcohol followed by one liter of isopropyl alcohol. To the second vessel there was then poured the heated contents from the first vessel, that is the naphthalene and camphor. The mixture was then stirred. The resulting com-

position was allowed to cool and was not utilized until after 24 hours had elapsed. The same composition was formulated utilizing a gasoline fraction known as Shell Sol 345, with results that were equivalent to those utilizing a conventional gasoline fraction.

EXAMPLE II

A known range 370 horsepower Diesel powered tractor was tested by adding 1 part of the composition of Example I to 4000 parts of the diesel fuel. Additionally, 1 part of the composition of Example I was added to 130 parts of the oil used in the tractor. The test was conducted over a one week period in which approximately 800 gallons of Diesel fuel were consumed, during which the tractor was driven 4200 miles. The fuel oil consumption was reduced 9%. The oil consumption was reduced 57%, while a 5.5% increase in horsepower was recorded. Further, there appeared to be an obvious reduction in smoke emission.

EXAMPLE III

The composition of Example I was added to Diesel equipment utilized to run electric generators in a mine application. A first Diesel motor was part of an Allis-Chalmers 100KW Skid-Mounted unit, which was situated at a mine portal at an elevation of 4,225 feet above sea level. The unit was operated continuously for approximately 20 hours each day, six days a week, at an ambient temperature between 39° and 79°F. The unit was operating under a constant load which was 40% of its rated capacity. The fuel consumption before adding the additive of Example I was 2.25 gallons per hour. One part of the additive of the invention was added to 4000 parts of diesel fuel, and the engine then run and measured four times each day for six consecutive days. The fuel consumption was reduced to 2.0 gallons per hour.

A second generator was used which was a 35KW skid-mounted unit, driven by a Continental engine, and was stationed at an elevation of 4,080 feet above sea level, with an ambient temperature range of 39 to 79%F. This generator was also operated approximately 12 hours each day, six days a week, under a very constant load of approximately 80% of its rated capacity. Before adding the additive of this invention, the fuel consumption was 4.28 gallons per hour. After utilizing one part of the additive per 3500 parts of the diesel fuel, the fuel consumption being measured over six days was 3.54 gallons per hour.

EXAMPLE IV

A 1964 Chrysler with about 70,000 miles was tested and was cold started and run through a customary seven cycles involving 7 modes each in accordance with standard tests set forth by pollution control board in the Los Angeles area. There were added 30 milliliters of the composition of Example I per each tank of gasoline. The capacity of the automobile tested was 22 gallons of gasoline. Additionally, 2 ounces of the additive was added during a 1,000 mile test run to the crank case oil. Tests were performed particularly to obtain the exhaust characteristics. The hydrocarbon reduction at a cold start was in the range of 19 to 21 percent. At a hot start the reduction was 46 percent. The carbon monoxide reduction at a cold start was 3 to 6 percent, and at a hot start the reduction was 55 percent. The nitrous oxide reduction of the exhaust gas upon a cold start was 3 to 6 percent and upon a hot start was 6 percent.

EXAMPLE IV

A Ford V-8 truck was tested utilizing the additive of Example I, in an amount of 1 part of the additive to 5000 parts of the gasoline. The truck was first run without the additive for a 15-day period and the calculated miles per gallon were 5.50. The truck was then run for the next 14 days with the additive present in the gasoline and the gasoline consumption was improved to 6.94 miles per gallon of gasoline. This represents a 26.2 percent increase in mileage improvement.

EXAMPLE V

A Honda E-300A engine driven generator was tested. The engine had a 4-stroke cycle and was a single cylinder design, having an F-head configuration. The compression ratio of the engine was 5.3:1 and its power output at 3600 R.P.M. was 0.74 horsepower. The engine drives a permanent magnet type alternator utilizing a choke as a voltage control device. The constant rated output of the generator is 300 Va at 120 volts. The load utilized for continuous testing consisted of two 200 watt light bulbs which consumed 335 Va at 120 volts. The power output measurements were measured with a 750 Watt wattmeter. The generator was first run for 5 hours on regular gasoline. After 5 hours of running at the above mentioned load, the generator was tested for maximum powerw output which was found to be 360 watts. It was then tested with the same brand of gasoline containing one part of the additive of Example I to 4000 parts of the gasoline. After 1 hour of operation, the maximum power output increased to 375 watts. After 2 hours of operation, this increased again to 380 watts. The maximum power output then remained constant for the next 90 hours, utilizing the gasoline containing the additive. The fuel consumption rate was monitored at 30-hour intervals during the 90-hour test period. The fuel consumption rate at the end of the first 30 hours operation with the additive was 0.132 gallons per hour. At the end of 60 hours it was still 0.132 gallons per hour. At 90 hours this decreased to 0.131 gallons per hour. At the end of this test period, the engine was then again run for 25 hours with the same brand of gasoline unmodified with the additive of the invention. The fuel consumption rate for this 25-hour period was 0.158 gallons per hour. The maximum power output at the end of 120 hours of the operation of the engine was 360 watts. Thus, there was an increase in power output utilizing the modified gasoline of 5.6%. There was a decrease in the specific fuel consumption of 16%.

EXAMPLE VI

A one-and-one-half ton truck powered by a 230 horsepower gasoline engine and operated in short-haul industrial service was tested over a 42-day period. Over the first 20 days the odometer reading went from 99,348 miles to 100,275 miles, for a total mileage of 927 miles, and a total of 169 gallons of normal untreated regular grade gasoline was consumed, for an average fuel consumption of 0.182 gallons per mile. Over the following 22 days, the odometer reading went from 100,275 miles to 101,455 miles, for a total of 1,180 miles, and a total of 170 gallons of regular grade gasoline, treated in the rate of 1 part of the composition of Example I to 5,000 parts of gasoline, was consumed, for an average fuel consumption of 0.144 gallons per

mile. For this test, the change from 0.182 gallons per mile to 0.144 gallons per mile amounted to a 20.9% reduction in specific fuel consumption.

I claim:

1. A liquid composition of matter comprising:
16 to 19.5 weight percent naphthalene,
6 to 8.7 weight percent camphor,
28 to 42 weight percent of a gasoline fraction,
36 to 45 weight percent toluene,
and 1.8 to 3.0 weight percent benzyl alcohol.

2. The composition of claim **1** further comprising:
up to 1.0 weight percent of an alkyl alcohol of 1 to 8 carbon atoms.

3. The composition of claim **1** comprising:
18.5 to 18.75 weight percent naphthalene
7.0 to 7.25 weight percent camphor,
33 to 37 weight percent of a gasoline fraction,
38 to 42 weight percent toluene,
and 2 to 3 weight percent benzyl alcohol.

4. The composition of claim **3** further comprising:
up to 1.6 weight percent of an alkyl alcohol of 1 to 8 carbon atoms.

5. The composition of claim **4** wherein said alkyl alcohol is isopropyl alcohol.

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