

UNITED STATES PATENT OFFICE.

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DELAWARE.

MOTOR FUEL.

No Drawing.

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This invention relates to a motor fuel, and to the burning of fuel mixtures in an internal combustion engine in the presence of substances added to a fuel or fuel mixture, including a compound of a metal, and, more particularly, a compound such as lead tetra ethyl, which decreases fuel knock. The present application is a continuation in part of my Patent No. 1,592,954 issued July 20, 1926, disclosing the use of halide compounds with a motor fuel, and lead tetra ethyl.

The object of the present invention is to prevent the formation of a deposit on engine parts and especially valve stems, resulting from the use of such compounds with the fuel in the combustion chamber of a motor.

By way of an example, I may form a knock suppressing composition by mixing, by volume, 40 parts of lead tetra ethyl, 18 parts of ethylene dibromide, 7 parts of monochlorinated naphthalene, and 5 parts of propylene dibromide. 4 cc. of this composition is added to a gallon of kerosene or gasoline, a fuel-air mixture is formed and the mixture is burned in an internal combustion engine. The composition vaporizes in the engine cylinder, and the gasoline or kerosene is burned in the presence of these vapors. One of the products of combustion is lead bromide. The ethylene dibromide and propylene dibromide are the source for the bromine which combines with the lead and so reduces the formation of lead oxide which fluxes more readily with engine parts such as spark plug points. Either the chlorinated naphthalene or the bromide compound may be omitted but the use of both is preferred.

Kerosene and gasoline are named merely as common examples of low compression fuels which give a fuel knock when a gaseous mixture containing the fuel is burned under relatively high compression. The composition given reduces the fuel knock.

The composition may be varied by changing the proportions and by using other chemical compounds. Other halogenated aromatic compounds such as brominated or chlorinated benzol, or brominated or chlorinated toluene or oils having similar physical characteristics including stability at relatively high temperatures may be used in place of mono-chlorinated naphthalene.

Apparently these compounds give lubrication and protection to valve stems.

A mixture of ethylene dibromide and propylene dibromide is preferred in cold weather because of its low freezing point. I may use in the fuel either of these or ethylene chlorobromide, butylene chlorobromide, amylene chlorobromide, tribromaniline, ethyl bromide, or other bromide compounds. While the bromide compounds are now preferred to the chlorine compounds, I may use ethylene dichloride, propylene dichloride, or butylene dichloride, trichloraniline or other chloride compounds. The quantity of each of these used depends on the amount of their halide content. Since the bromide compounds are, generally, more effective than the chloride compounds, the quantity of bromides used may be smaller than the chlorides.

The lubricant, such as a halogenated aromatic compound, has been found effective with compounds of other metals, such, for example, as arsenic, tin, nickel, iron, zinc, and many others. The hydrocarbon compounds of the metals such as the alkyl compounds, and the carbonyl compounds such as nickel carbonyl and iron carbonyl are preferred. Other metal compounds are titanium tetrachloride, and tin tetra-chloride.

For commercial purposes a composition which is a single phase or homogenous liquid and oil soluble is preferred. When substances such as tribromaniline and tribromophenol are used, separate phases of the composition result but are all soluble in the gasoline. In such a case I may employ multi-stage mixing with the gasoline or other fuel. If desired, blending agents, such as benzol, may be used.

I have found that motor compounds which become volatile under engine conditions are best adapted to reduce fuel knock.

What I claim is:

1. A motor fuel comprising a hydrocarbon, a volatile compound of a metal, and a halogenated lubricating oil.
2. A motor fuel comprising a hydrocarbon, a volatile compound of a metal, a halogenated lubricating oil and a substance adapted to form on combustion, a non-fluxing compound with said metal.
3. A motor fuel comprising a hydrocar-

- bon, a volatile compound of a metal and a halogenated oil.
4. A motor fuel comprising a hydrocarbon, a volatile compound of a metal and a chlorinated oil.
5. A motor fuel comprising a hydrocarbon, a volatile compound of a metal, and a lubricant.
6. A motor fuel comprising a hydrocarbon, a volatile compound of lead and a halogenated lubricating oil.
7. A motor fuel comprising a hydrocarbon, a volatile compound of lead and a halogenated oil.
8. A motor fuel comprising a hydrocarbon, a volatile compound of lead, and a chlorinated oil.
9. A motor fuel comprising a hydrocarbon, a volatile lead compound and a volatile bromide compound.
10. A motor fuel comprising a hydrocarbon, a hydrocarbon compound of lead, and a volatile bromide compound.
11. A motor fuel comprising a hydrocarbon, a lead alkyl compound, and a volatile bromide compound.
12. A motor fuel comprising a hydrocarbon, lead tetraethyl, and ethylene dibromide.
13. A motor fuel comprising a hydrocarbon, a volatile lead compound, a volatile halide compound, and a lubricant.
14. A motor fuel comprising a hydrocarbon, a volatile lead compound, a volatile bromide compound, and a lubricant.
15. A motor fuel comprising a hydrocarbon, a lead alkyl compound, a volatile bromide compound and a halogenated oil.
16. A motor fuel comprising a hydrocarbon, lead tetra ethyl, ethylene dibromide, and mono-chlorinated naphthalene.
17. A composition of matter comprising a volatile compound of a metal, and a halogenated lubricating oil.
18. A composition of matter comprising a volatile metal compound and a halogenated oil.
19. A composition of matter comprising a volatile lead compound and a halogenated aromatic compound.
20. A composition of matter comprising a lead alkyl compound and a chlorinated oil.
21. A composition of matter comprising a volatile lead compound and a volatile bromide compound.
22. A composition of matter comprising a lead alkyl compound and a volatile bromide compound.
23. A composition of matter comprising lead tetra ethyl and a volatile bromide compound.
24. A composition of matter comprising a lead alkyl compound, a volatile bromide compound and a halogenated oil.
25. A composition of matter comprising lead tetra ethyl, ethylene dibromide, and mono-chlorinated naphthalene.

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