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MOTOR FUEL

Hyym E. Buc, Roselle, N. J., assignor to Standard Oil Development Company, a corporation of Delaware

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This invention relates to motor fuels and methods of preparing same for use in internal combustion engines and the like, and relates more particularly to motor fuels blended with agents which tend to reduce the knocking of the engine.

Ethers have been added to motor fuels in the past and are generally known as knock inducers; but I have discovered that branched ethers, contrary to expectation, are particularly useful in reducing the knocking tendency of a hydrocarbon motor fuel such as the gasoline obtained from petroleum by known commercial methods. By the term "branched ethers" is meant an ether of the general formula $R-O-R'$ where either one or both R and R' are branched hydrocarbon radicals, either alike or unlike. If only one is branched, the other may be any other hydrocarbon radical, such as alkyl, aryl, etc. Such branched ethers which may be prepared in general from secondary and tertiary alcohols by any of the well known methods are, according to the invention, blended with a motor fuel in any desired proportion, such as 5%, 10%, 30%, 50% or more.

As one particular example, 30% of isopropyl ether is added to a commercial gasoline motor fuel. Tests indicate that the octane number (the higher the octane number the less tendency to knock) at 375° F. was increased from 68.2 to 77.5, resulting in an increase of 9.3. This anti-knock agent has an additional advantage in that it has a high lead susceptibility, meaning that additions of lead tetraethyl will accomplish a still further increase in octane number. For example, 1 c. c. of lead tetraethyl added to the commercial gasoline used in the above tests increased the octane number from 68.2 to 77.5 but adding 1 c. c. of lead tetraethyl to the blend of gasoline containing 30% isopropyl ether resulted in an octane number of 87.4, giving a lead susceptibility of about 10. Some relatively good anti-knock agents have poor lead susceptibility.

The increase in octane number is roughly proportional to the amount of anti-knock agent used, so if less than 30% isopropyl ether is used, say 15%, a correspondingly less anti-knock effect will be produced.

Instead of using isopropyl ether, a number of other branched ethers may be used; for example, a tertiary butyl ether or mixed ethers such as a methyl tertiary butyl ether or methyl tertiary amyl ether, etc.

In addition to the advantages mentioned above, the branched ethers contemplated by the invention also possess the valuable characteristic that they may be blended in practically any proportion with hydrocarbon motor fuels and one need

not be concerned with the subject of water tolerance as they are insoluble in water, the same as the hydrocarbon motor fuel. Alcohols are the best previously known blending agents, but they have the disadvantage of being "dropped out" by slight additions of water.

Having thus described the invention, I do not desire to be limited by any of the examples which have been given for the sake of illustration only but I desire to claim all novelty inherent in the invention as far as the prior art permits.

I claim:

1. A motor fuel comprising a mixture of hydrocarbons boiling within the gasoline range having its octane number improved by an addition of a substantial amount of a normally liquid ether miscible with gasoline and boiling within the gasoline boiling range, and having the structure $R-O-R'$ in which at least one of R and R' is a branched aliphatic hydrocarbon radical and both R and R' are hydrocarbon groups.

2. A motor fuel according to the preceding claim in which at least one of R and R' is an aliphatic hydrocarbon radical containing a tertiary carbon atom which is linked to the ether oxygen.

3. A motor fuel according to claim 1 in which the ether constitutes at least 5% of the composition.

4. A motor fuel according to claim 1 in which the ether constitutes from 5 to 50% of the composition.

5. A motor fuel according to claim 1 in which the octane number of the hydrocarbon mixture is further improved by the addition of an anti-knock composition comprising a lead alkyl compound.

6. A motor fuel according to claim 1 in which the ether is isopropyl ether.

7. A motor fuel according to claim 1 in which the ether is isopropyl ether and constitutes from 5 to 50% of the fuel.

8. A motor fuel comprising gasoline having its octane number improved by an addition of at least 5% of isopropyl ether.

9. A gasoline motor fuel having its anti-knock value increased by admixture thereto of di-isopropyl ether in quantity ranging from about 10-30%.

10. A motor fuel comprising a mixture of hydrocarbons boiling within the gasoline range having its octane number improved by an addition of from 5 to 50% of methyl tertiary butyl ether.

11. A motor fuel comprising a mixture of hydrocarbons boiling within the gasoline range having its octane number improved by an addition of from 5 to 50% of methyl tertiary amyl ether.

HYYM E. BUC.