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ANTIDETONATING AGENT AND MOTOR FUEL CONTAINING SAME

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This invention relates as indicated to antidetonating agents for motor fuels and fuels containing such agents and pertains more specifically to improvements in certain types of such compounds which, while possessing anti-detonating properties, have not been particularly useful commercially on account of certain undesirable characteristics possessed thereby.

More specifically, this invention relates to antidetonating or "anti-knock" agents for motor fuels and motor fluels containing the same of the class generally represented by certain iron and nickel compounds which, while possessing anti-detonating properties, are subject to a decided disadvantage, namely the precipitation of such metals in the form of insoluble compounds.

It is the principal object of this invention, therefore, to make available for practical commercial usage such anti-detonating compounds which, on account of the named undesirable characteristics, have heretofore not been extensively used commercially.

Other objects of our invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail one approved combination of ingredients embodying our invention, such disclosed means constituting, however, but one of various forms in which the principle of the invention may be used.

This invention may be broadly stated as comprising the discovery that certain materials hereinafter more specifically identified are effective when used in conjunction with anti-detonating compounds of the type represented by iron carbonyl and nickel carbonyl in inhibiting the precipitation of the metals from compositions containing such compounds.

The metal compounds of the type above referred to, for example, iron carbonyl, when added to a motor fuel in amounts effective to inhibit the detonating effect of such fuel, e. g., from one to four grams per gallon, will be precipitated from such fuel, probably in the form of iron hydroxide or oxide, particularly upon exposure to actinic rays and air or other oxidizing agents. Such precipitation will also take place when the metal compounds are stored in the form of concentrated solutions, for example, 50% in solvents such as kerosene.

We have discovered that by using in conjunction with anti-detonating agents such as iron carbonyl and nickel carbonyl, minor amounts of a compound of the class consisting of hydroxy ethers (condensed polyhydric alcohols) and esters of such ethers such as a fatty acid ester of a di-hydric ether, for example, an amount equivalent to from one-fifth to four-fifths of the weight of the metal carbonyl, the previously mentioned tendency of such compounds to precipitate is inhibited to such an extent that any precipitation which does take place is no longer objectionable.

One of the most effective of the fatty acid esters of di-hydric ethers is di-glycol stearate. This compound is available upon the commercial market at a price which permits its economic use in the above described compositions. The commercial supply consists of a mixture of the mono- and di-esters and such a mixture is satisfactory for the desired purpose.

The di-glycol stearate is a solid at ordinary temperatures and, while not sufficiently soluble in the kerosene or similar concentrated solution above referred to, to form a true solution in the amount required, will, nevertheless, form a stable type of suspension if subjected to ordinary mixing means and particularly if passed through a homogenizing device such as that disclosed in Cornell Patent No. 2,042,880.

The concentrated solution containing the diglycol stearate may be stored as such and used when required by mixing in the proper proportions or by dissolving in the proper proportions in the fuel to be treated.

It is preferable that the fatty acids used to form esters with the poly-hydric ethers be long-chain compounds and the laurates, palmitates, oleates, etc. of such ethers are all highly efficient in producing the effect desired.

The di-hydric ethers may be formed by the condensation of two di-hydric alcohols, as by condensing two molecules of glycol to form glycol ether or di-ethylene glycol. This resultant compound may then be esterified by treating with a fatty acid such as stearic acid and a product is obtained, generally consisting of a mixture of the mono- and di-esters, for example, di-glycol stearates. It is to be understood, however, that this invention is not limited by any particular process of forming the addition agent nor restricted by any explanation or theory as to the manner in which the desired effect is obtained.

The motor fuels to which the improved antidetonating agent may be added may be any of the usual hydrocarbon fuels of mineral origin such as gasoline, kerosene, etc., or may be other types of fuel such as alcohols, ethers, etc., or

mixtures of the latter compounds with hydrocarbon fuels.

The amounts to be added depend upon the characteristic anti-detonating tendency of the fuel and where the concentrated solution contains about 50% by weight of the metal carbonyl, the amount added may range from about one-half cubic centimeter per gallon of fuel to about fifteen cubic centimeters per gallon of fuel.

A solution containing about 40% kerosene, about 40% iron carbonyl, and about 20% di-glycol stearate, when added on the order of four cubic centimeters per gallon of gasoline having an octane rating of about sixty-five, was found to produce a very satisfactory anti-detonating fuel.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the materials employed in carrying out the process, provided the ingredient or ingredients stated in any of the following claims or the equivalent of such stated ingredient or ingredients be employed.

We, therefore, particularly point out and distinctly claim as our invention:

1. An anti-detonating agent for addition to internal combustion engine fuels comprising a major proportion of a carbonyl compound of a metal of the class of iron and nickel and a fatty acid ester of a minor proportion of a poly-hydric ether soluble in the fuel.

2. An anti-detonating agent for addition to internal combustion engine fuels comprising the combination of a major proportion of a carbonyl compound of a metal of the class consisting of iron and nickel and a minor proportion of a fatty acid ester of a di-hydric ether soluble in the fuel.

3. An anti-detonating agent for addition to internal combustion engine fuels comprising a major proportion of a carbonyl compound of a metal of the class consisting of iron and nickel and a minor proportion of a fatty acid ester of glycol ether.

4. An anti-detonating agent for addition to internal combustion engine fuels comprising a major proportion of a carbonyl compound of a metal of the class consisting of iron and nickel and a minor proportion of a long-chain fatty acid ester of di-ethylene glycol.

5. An anti-detonating agent for addition to internal combustion engine fuels comprising a major proportion of iron carbonyl and a minor proportion of di-glycol stearate.

6. An anti-detonating agent for addition to internal combustion engine fuels comprising a major proportion of nickel carbonyl and a minor proportion of di-glycol stearate.

7. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of minor amounts of nickel carbonyl and fatty acid ester of a poly-hydric ether soluble in the fuel.

8. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of minor amounts of iron carbonyl and a fatty acid ester of a poly-hydric ether soluble in the fuel.

9. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of minor amounts of iron carbonyl and a fatty acid ester of a condensed poly-hydric alcohol soluble in the fuel.

10. An internal combustion engine fuel comprising a major proportion of a light hydrocarbon fuel the anti-detonating properties of which are improved by the addition of minor amounts of nickel carbonyl and di-glycol stearate.

11. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of minor amounts of iron carbonyl and di-glycol stearate.

12. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of about four cubic centimeters per gallon of a concentrate containing about 40% solvent, 40% iron carbonyl, and 20% di-glycol stearate by weight.

13. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of one-half to fifteen cubic centimeters of an anti-knock concentrate containing about 50% by weight of iron carbonyl and from about 10% by weight to about 40% by weight of di-glycol stearate per gallon of fuel.

14. An internal combustion engine fuel comprising a major proportion of a hydrocarbon fuel the anti-detonating properties of which are improved by the addition of one-half to fifteen cubic centimeters of an anti-knock concentrate containing about 50% by weight of nickel carbonyl and from about 10% by weight to about 40% by weight of di-glycol stearate, per gallon of fuel.

15. An internal combustion engine fuel comprising a major proportion of gasoline the anti-detonating properties of which are improved by the addition of minor amounts of iron carbonyl and di-glycol stearate.

16. As a new composition of matter, a concentrate suitable for use as an anti-detonating addition agent to motor fuels comprising a major proportion of a light solvent and a minor proportion each of a carbonyl compound of a metal of the class consisting of iron and nickel and a fatty acid ester of a poly-hydric ether soluble in the fuel.

17. As a new composition of matter, a concentrate suitable for use as an anti-detonating addition agent to hydrocarbon motor fuels comprising a major proportion of a light hydrocarbon solvent and a minor proportion each of a carbonyl compound of a metal of the class consisting of iron and nickel and di-glycol stearate.

18. The method of inhibiting the precipitation of iron and nickel compounds in a motor fuel when such fuel contains a carbonyl compound of a metal of the class consisting of iron and nickel which comprises dissolving therein minor amounts of a fatty acid ester of a di-hydric ether.

19. The method of stabilizing a motor fuel which contains a carbonyl compound of a metal of the class consisting of iron and nickel by dissolving therein minor amounts of di-glycol stearate.

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CERTIFICATE OF CORRECTION.

Patent No. 2,145,889. February 7, 1939.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 29, claim 1, strike out the words "a minor proportion of" and insert the same after "and" second occurrence, in line 28, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of March, A. D. 1939.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.