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MODEL ENGINE FUEL

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This invention relates to fuels for internal combustion engines of the high speed type such as model engines for midget racing cars, model airplanes, etc., and more particularly it relates to ignition promoters added to such fuels in order to improve the ignition characteristics.

Fuels generally used in the type of engines contemplated here are nitroparaffin-methanol mixtures. This fuel operates advantageously in this type of engine due to the very high rate of ignition and the completeness of its ignition. Model airplane engines, while broadly defined as internal combustion engines, are of three types one of which is in reality a semi-compression ignition engine. In the semi-compression ignition engines the fuel is not ignited by a timed spark, air being carburated with the fuel and the subsequent mixture entering the combustion chamber as an ignition charge where the fuel-air mixture is then spontaneously ignited by a combination of compression, heat, and catalytic action from the walls of the combustion chamber and from a glow plug which is generally a platinum wire electrically heated for starting and then heated by the combustion of the engine after the engine has been started.

The nitroparaffins suitable for use in nitroparaffin-methanol base fuels are the lower mononitroparaffins including nitromethane, nitroethane, 1-nitropropane, and 2-nitropropane. Of these I prefer to use nitromethane since there are successive losses in power developed by the fuel as the number of carbon atoms in nitroparaffin increases.

Nitromethane-methanol mixtures, while conceded to be better than any other fuel for model engines, have several disadvantages when the object of model engines is considered. For instance in dealing with model airplanes, the object is for the engine to develop maximum power so that the highest speeds possible can be obtained. This is realized through the development of the absolute maximum number of propeller revolutions per minute. In order for this object to be obtained, the fuel used must be completely and almost instantaneously ignited for if it is not ignited almost at once there is a lag in combustion and the maximum number of propeller R. P. M. cannot be reached. Such a difficulty leads to the other defect in that the fuel is not completely ignited resulting in carbon formation and exhaust of fuel with consequent waste. While nitromethane-methanol mixtures have been found to have very high ignition rates as well as being almost completely consumed

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still there is some lag in ignition and some lack of complete ignition.

The object of the present invention is to provide a lower mononitroparaffin-methanol base fuel for model engines of the type described which has an increased rate of ignition and the property of complete combustion upon ignition thus giving an increase in power delivered through an increased number of propeller revolutions per minute in the case of model airplane engines.

I have discovered that by adding 2,2-dinitropropane to the mononitroparaffin-methanol fuel mixtures, I can improve the ignition rate and the completeness of ignition of the fuel with a consequent increase in power delivered as evidenced by an increase in the number of propeller revolutions per minute in the case of model airplane engines.

The amount of 2,2-dinitropropane to be added to the fuel mixture depends on the proportion of the components of the fuel. Generally, the amount to be used may be said to range from 0.25% to 2.0% by weight of the final mixture with the best results usually being obtained when 1% is used.

It should be pointed out that most fuels used in model engines must contain a lubricant, castor oil usually being used for that purpose. The amount of castor oil to be used depends on the engine design, and generally, if it is to be used at all, the amount employed ranges from 15% to 30% by volume of the final mixture. I prefer to use castor oil in the amount of 25% by volume of the final mixture.

The lower mononitroparaffin, generally nitromethane, and the methanol are ordinarily blended in proportions which deliver the most power for the particular engine being used. Generally it can be said that the amount of nitroparaffin an be as high as 45% of the final mixture when nitromethane is used, however, I prefer to use fuels containing from 30 to 40% nitromethane by volume. When nitroethane or nitropropane are used, the amount to be blended with the methanol is successively decreased.

The effectiveness of 2,2-dinitropropane can be demonstrated by reference to tests run with model engines where fuels with and without the ignition promoter were used and the number of propeller revolutions per minute measured.

The following tables show the results of tests run with various fuels, the compositions of which are indicated. All percentages in the following tables and in the attached claims are by volume

except that percentages of 2,2-dinitropropane are by weight.

TABLE I

McCoy "49" engine

Fuel Formula	R. P. M.
37.5% Nitromethane 37.5% Methanol 25% Castor Oil	10,500
37.5% Nitromethane 35.5% Methanol 25% Castor Oil 2% 2,2-Dinitropropane	11,000
37.5% Nitromethane 36.5% Methanol 25% Castor Oil 1% 2,2-Dinitropropane	11,400

TABLE II

Dooling "60" engine

Fuel Formula	R. P. M.
37.5% Nitromethane 37.5% Methanol 25% Castor Oil	13,900
37.5% Nitromethane 37% Methanol 25% Castor Oil 0.5% 2,2-Dinitropropane	14,100
37.5% Nitromethane 36.5% Methanol 25% Castor Oil 1% 2,2-Dinitropropane	14,300
37.5% Nitromethane 35.5% Methanol 25% Castor Oil 2% 2,2-Dinitropropane	14,200

TABLE III

Dooling "60" engine

Fuel Formula	R. P. M.
30% Nitromethane 45% Methanol 25% Castor Oil	13,900
30% Nitromethane 44% Methanol 25% Castor Oil 1% 2,2-Dinitropropane	14,000
30% Nitromethane 43% Methanol 25% Castor Oil 2% 2,2-Dinitropropane	14,100

From the foregoing tables it can be seen that the engines are able to deliver more power when 2,2-dinitropropane is added to the fuel since the number of propeller revolutions per minute is shown to have been increased by as much as 8.5% in the case of the McCoy "49" Engine when 2,2-dinitropropane was added to the fuel.

While the above examples point out specific embodiments of my invention, it is to be understood that I am not to be limited to the procedures or formulae shown therein, all obvious equivalents being considered within the scope of my invention as disclosed in the specification and attached claims.

Now having disclosed my invention, what I claim is:

1. A fuel containing a base consisting of methanol and a mononitroparaffine containing from one to three carbon atoms per molecule, the said fuel further containing 2,2-dinitropropane in an amount sufficient to act as an ignition promoter.

2. A mononitromethane-methanol base fuel containing 2,2-dinitropropane in an amount sufficient to act as an ignition promoter.

3. A fuel containing a base consisting of methanol and a mononitroparaffin containing from one to three carbon atoms per molecule, the said fuel further containing from 0.25% to 2.0% 2,2-dinitropropane.

4. A mononitromethane-methanol base fuel containing from 0.25% to 2.0% 2,2-dinitropropane.

5. A mononitroethane-methanol base fuel containing from 0.25% to 2.0% 2,2-dinitropropane.

6. A mononitropropane-methanol base fuel containing from 0.25% to 2.0% 2,2-dinitropropane.

7. A mononitromethane-methanol base fuel containing 1% 2,2-dinitropropane.

8. A model engine fuel which comprises from 10% to 94% methanol, 5% to 45% mononitromethane, 15% to 30% castor oil, and 0.25% to 2.0% 2,2-dinitropropane.

9. A model engine fuel which comprises from 35% to 45% methanol, 30% to 40% mononitromethane, 15% to 30% castor oil, 0.25% to 2.0% 2,2-dinitropropane.

10. A model engine fuel which comprises 37.5% mononitromethane, 36.5% methanol, 25% castor oil, and 1.0% 2,2-dinitropropane.

11. A model engine fuel which comprises 30% mononitromethane, 43% methanol, 25% castor oil, and 2% 2,2-dinitropropane.

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