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HEAVY OIL FUEL

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This invention relates to improvements in fuels for internal-combustion engines of the type in which a combustible material is introduced into a mass of highly compressed and heated air. The invention has particular reference to fuels for engines of the Diesel type, and will be described for illustration in this connection.

In accordance with the present invention, a component adapted to secure substantially instantaneous and continuous ignition is added to Diesel fuel. Such component is preferably an organic compound containing nitrogen and oxygen. Nitro compounds, such as the alkyl esters of nitrous acid, are particularly suitable, for example isopropyl nitrite, butyl nitrite and ethyl nitrite. The group of nitroparaffins, isomeric with the alkyl nitrites just mentioned, are also suitable. Thus, nitroethane and nitropentane may be used with good results. Some aryl nitro compounds, especially dinitrobenzene and trinitrobenzene, may be used. Compounds of greater complexity containing the NO group also will serve my purpose, for example nitroso-isopropyl-para-toluidine.

A common property of all the substances mentioned above is the tendency to produce knocking or detonation when used as a component of a gasoline fuel for internal-combustion engines. When used in a Diesel fuel, however, these compounds are not knock-producing but have predominantly rather the opposite effect. Their function is to cause instantaneous, or substantially instantaneous and continuous ignition of the fuel as it is injected, thus avoiding the accumulation of a large amount of unburnt fuel in the cylinder and resultant generation of excessive pressures at the time of ignition.

One or more of the members of the classes of compounds mentioned may be added to Diesel fuel, especially heavy hydrocarbon oil fuels. In general, a small amount of ignition-facilitating compound is sufficient. When a highly effective compound, such as isopropyl nitrite, is used, amounts approximating 0.10% by volume of the oil will give good results. Compounds of a lower degree of effectiveness, such as dinitrobenzene, require to be used in amounts up to about 5% of the volume of the oil. As is well known, Diesel engines may be operated with a variety of oils having widely different properties, and it is therefore impractical to give precise directions for each case. As one example of the use of the invention, the addition of 0.10% of isopropyl nitrite to fuel oil of 20° to 32° Bé. may be specified.

For the proper operation of Diesel engines the fuel should be injected at such a rate that combustion takes place without substantial increase in the cylinder pressure. In practice, however, this desirable condition is not always obtained, due to the failure of the heavy hydro-carbon oil, or other fuel, to ignite as rapidly as it is injected. A considerable charge of fuel may accumulate in the cylinder before ignition. When combustion does take place it is likely to be very rapid, or even explosive. The resulting sudden increase of pressure produces shocks that may be destructive to the engine. Even where the violence of the action is not sufficient to cause mechanical injury, inefficient utilization of the fuel results from the lack of timely and regular ignition. These defects are overcome by the present invention.

In some cases it is practical, when using the improved fuel, to maintain an injection rate higher than would be generally permissible with the fuels heretofore known. In this way the speed of the engine may be increased and greater horse-power obtained.

The foregoing examples are merely illustrative of preferred embodiments of the invention. Various changes may be made within the scope of the appended claims, in which it is my intention to claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. A fuel oil for Diesel engines and the like, and consisting essentially of a heavy petroleum oil and less than 5% by volume of a substance selected from the class of nitro-paraffin and alkyl nitrite compounds, and which induces knocking or detonation when used in combination with a gasoline fuel for internal combustion engines.

2. A fuel oil for Diesel engines and the like, and comprising a heavy petroleum oil containing an alkyl nitrite in effective amount not greater than 5% by volume.

3. A fuel oil for Diesel engines and the like and comprising a heavy petroleum oil containing isopropyl nitrite in amount about 0.10% by volume.

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