

UNITED STATES PATENT OFFICE.

FRANK L. DIETZ, OF BROOKLYN, NEW YORK.

FUEL OIL.

No Drawing.

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To all whom it may concern:

Be it known that I, FRANK L. DIETZ, a citizen of the United States of America, residing at Brooklyn, county of Queens, State of New York, have invented certain new and useful Improvements in Fuel Oils, of which the following is a specification.

This invention relates to fuel oils and it particularly relates to that class of fuel oil which is used in internal combustion engines for the production of power, the object of the invention being to produce a fuel oil which will flash in the cylinder of an internal combustion engine at the normal temperature prevailing in the various seasons of the year and which will readily serve for an improved power production at a lower price for such power than heretofore possible.

Notwithstanding the many efforts to substitute the relatively expensive gasoline by other oils or liquids which appear to lend themselves readily for the production of an explosive gas mixture to be ignited within the cylinder of a gas engine, it has maintained its place because drawbacks attach to either, inherent in same or having their cause in the economical situation connected with same in so far that usually one or the other ingredient is so rare or must be applied in such proportions that the price finally becomes prohibitive.

I have now found such a substitute for gasoline in the low temperature tar as obtained in the dry distillation of coal either in the retort, or in the gas producer, at a temperature of from 400° C. up to 600° C., if said low temperature tar is mixed with other ingredients as for instance a mixture of an alcohol and a hydrocarbon, or a mixture of hydrocarbons which is miscible, or soluble, in said alcohol, the hydrocarbon and the alcohol boiling at practically the same temperature, i. e. 79 centigrade; as an alcohol I preferably use ethylalcohol and as a hydrocarbon either gasoline or benzene, C_6H_6 .

The tar produced by the coking of coal at such a low range of temperature, which is of recent development, is greatly different in its composition and properties from the black tar of the old style dry distillation. The tar obtained by the dry distillation of coal at the low temperature referred to above, has the following general characteristics:

1.—it is a clear liquid at room tempera-

ture and should not have any sediment of a solid hydrocarbon, 2.—its specific gravity at 25° C. is within 0.96–1.06—3.—in a thin layer it is of golden reddish color, 4.—in the fresh state it does not smell of naphthalene, but exhibits a smell of hydrogen sulfide.

It has a very high content of phenols, but is free of benzene, naphthalene, and anthracene which are characteristic for the old style crude tar. Occasionally the properties of the tar may vary to some extent according to the kind of coal distilled, but the characteristics pointed out above are generally present. It may furthermore be said that the tar, which is produced from coal showing a long flame and therefore is preferred in the manufacture of illuminating gas, is the best representative of such low temperature tar and consists of approximately equal parts of hydrocarbon and phenols. As to the composition of the hydrocarbons investigations have shown that it consists of a multitude of hydrocarbons in which no particular class predominates; there are very few hydrocarbons of the paraffine series, but a considerable part are olefines, naphthene, hydrated aromatic hydrocarbons. The character of the hydrocarbons, constituting approximately one half of the low temperature tar, which includes also noticeable traces of sulphur compounds and nitrogen products, is that of a crude petroleum oil poor in paraffins, such as for instance occurring in Baku. As the phenols occurring in low temperature tar, they constitute the other half of same; the lowest members of the series of phenols occur only in traces, for instance carbolic acid to 0.06%, cresol and xylenol to about 1% each, and it has been observed that the main part decomposes in the distillation at a temperature above 300° C. turning into a solid, shining pitch; the same behavior is also displayed by the phenols of this tar when heated under exclusion of air as well as when standing on the air.

This behavior is all the more important as also the hydrocarbons of the low temperature tar per se behave similarly; the unsaturated hydrocarbons, as for instance those of the olefine series, probably also of the acetylene series, behave similarly to the phenols and when subject to heat or on contact with the air, polymerize and oxidize, thereby becoming dark in color and ultimately being solidified into resin like substances. In fact,

the property of the low temperature tar to thicken and to finally solidify by the action of the air upon same, puts this material into the class of the drying oils and it actually
5 found considerable use with great success as a paint or coating material for all kinds of structures, especially when its dark color is of no concern. Of such coats, for instance on wooden structures, some are already
10 known of several years' standing and to be of excellent condition. As furthermore the hydrocarbons have a very high boiling point the low temperature tar, as it is obtained, is directly used as a lubricating oil and has
15 given highly satisfactory service for several years, especially owing to the excellent viscosity of its hydrocarbon constituents. So the hydrocarbons as well as the phenols, constituting together the low temperature tar,
20 are neither alone for themselves, nor combined in mixture such a material of which one might expect that it could be rendered available for a fuel oil to generate power in internal combustion engines.
25 I have now found out that this tendency of the low temperature tar to dry, or to solidify, as caused by the polymerization, or oxidation of the hydrocarbons as well as of the phenols can be overcome and that a mixture
30 of an alcohol with a hydrocarbon miscible or soluble in such alcohol, as for instance gasoline or benzene in ethylalcohol which all boil at practically the same temperature, i. e. at 79 centigrade, acts as an anti-solidification
35 agent which successfully prevents the drying or solidification of the low temperature tar.

If I mix this tar with for instance ethylalcohol and benzene in the proportion of 1 part benzene, 1 part ethylalcohol, 1 part low
40 temperature tar I produce a motor fuel which is very low priced and fills the highest requirements asked of a motor fuel as to its readiness to volatilize in the carburetor and to ignite in that infinitely short time
45 which is the paramount necessity to give a brisk impact upon the piston without knocking.

What I claim is:

1. A fuel oil for the generation of power
50 by explosion engines, consisting of low temperature tar and of a mixture consisting of an alcohol and a hydrocarbon, both boiling at approximately 79 centigrade miscible therewith, as an agent capable of preventing
55 the solidification of said low temperature tar.

2. A fuel oil for the generation of power by explosion engines, consisting of low temperature tar and a mixture of an ethylalcohol
60 and of a hydrocarbon, boiling at approximately 79 centigrade miscible therewith.

3. A fuel oil for the generation of power by explosion engines, consisting of low temperature tar; an alcohol, boiling at approximately 79 centigrade and benzene.
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4. A fuel oil for the generation of power by explosion engines, consisting of low temperature tar, ethylalcohol and benzene.

In testimony whereof, I have signed my
70 name to this specification, this 10th day of November, 1921.

FRANK L. DIETZ.