

UNITED STATES PATENT OFFICE

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MOTOR FUEL

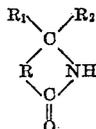
No Drawing.

Application filed July 23, 1931. Serial No. 552,798.

This invention relates to motor fuels and more particularly to motor fuels containing unsaturated constituents, which tend to form gums such as the so-called cracked gasolines.

Cracked gasolines command a premium as motor fuels at the present time owing to their excellent anti-knock qualities. However, they are open to the disadvantage that they form gum and discolor, particularly, when exposed to sunlight. It has been proposed in the past to stabilize unsaturated motor fuels and inhibit or minimize gum formation by the addition of stabilizers, among which, only two have achieved any practical success, namely, anthracene and acid amides of aromatic amines such as acetanilide.

I have found that very effective stabilizers for unsaturated motor fuels are reduced cyclic imides, such as the imidines and hydroxyimides of the general formula



where R is a hydrocarbon, R_1 and R_2 are H, OH, hydrocarbon or where R_1 and R_2 are combined as a single oxygen atom. While the present invention is in no sense limited to any particular imidines or hydroxyimides, I have found that the cheapest members of this class, namely, phthalimidine and hydroxyphthalimidine are highly effective and because of their extremely low cost compared to other members of the class they are particularly attractive commercially. Substituted imidines in which the hydrogen of the NH group is substituted by other radicals are also highly effective, for example, the ordinary alkyl phthalimidines and hydroxyphthalimidines, such as, methyl or ethyl phthalimidines can be used as can the aryl derivatives, such as, phenyl or benzyl phthalimidine. Hydroxyalkyl compounds such as methanol or ethanol phthalimidines are likewise effective. Similarly, the imidines and hydroxyimides of naphthalic

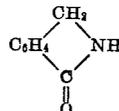
anhydride and their substitution products may be employed as well as similar succinimidines and hydroxysuccinimidines. In fact the present invention is generally applicable to imidines and hydroxyimides from polycarboxylic acids, both aromatic and aliphatic.

It is some times desirable to prevent the formation of acid in motor fuels by adding small amounts of the base as an antacid. Examples of such bases are amines, particularly aromatic amines, aniline, toluidine, and the like.

The invention will be described in greater detail in connection with the following specific examples, which illustrate typical motor fuels falling within the scope of the present invention.

Example 1

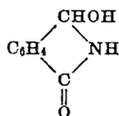
2-4 pounds of phthalimidine



are mixed with 100 barrels of cracked gasoline to yield a highly stabilized motor fuel of excellent quality.

Example 2

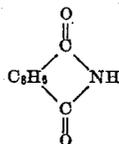
2-5 pounds of hydroxyphthalimidine



are added to 100 barrels of cracked gasoline, producing a thoroughly stabilized motor fuel.

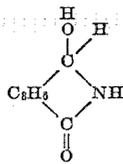
Example 3

3-6 pounds naphthalimidine



or hydroxynaphthalimidine

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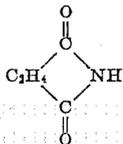


are added to 100 barrels of cracked gaso-
10 line to obtain a stabilized motor fuel.

Example 4

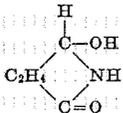
3-6 pounds succinimidine

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20 or hydroxysuccinimidine

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are added to 100 barrels of cracked gaso-
line to obtain a stabilized motor fuel.

Example 5

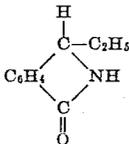
4-6 pounds of methyl or ethyl naphthali-
midine or hydroxynaphthalimidine and ani-
line are added to 100 barrels of cracked
gasoline to produce a stabilized motor fuel.

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Example 6

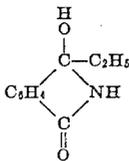
2-5 pounds of ethylphthalimidine

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45 or ethyl hydroxyphthalimidine

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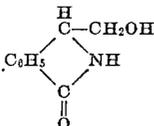
are added to 100 barrels of cracked gaso-
line to produce a stabilized motor fuel.

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Example 7

2-6 pounds of methanol phthalimidine

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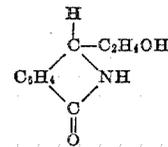


are added to 100 barrels of cracked gaso-
65 line to produce a stabilized motor fuel.

Example 8

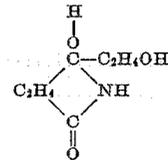
2-5 pounds of ethanol phthalimidine

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or ethanol hydroxyphthalimidine

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are added to 100 barrels of cracked gaso-
line to produce a stabilized motor fuel.

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Example 9

2-5 pounds of phthalimidine or hydroxy-
phthalimidine and 6 pounds of aniline or
toluidine are added to 100 barrels of cracked
gasoline forming a well stabilized motor fuel.

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In the examples the amount of stabilizers
is a fraction of 1%. In general, this is suf-
ficient to obtain satisfactory stabilization.
Larger amounts of stabilizers, of course, do
no harm, but it is normally unnecessary to
use them in quantities larger than 1%.

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In the claims the expression "cyclic imi-
dine substance" includes not only the imi-
dines of polycarboxylic acids, but the hy-
drogenated and substitution products of the
imidines and hydroxyimidines.

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What is claimed as new is:

1. A cracked motor fuel containing a cyclic
imidine substance in an amount sufficient to
inhibit gum formation.

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2. A motor fuel containing unsaturated
gum forming constituents and a cyclic imi-
dine substance in an amount sufficient to in-
hibit gum formation.

3. A cracked motor fuel containing a
phthalimidine substance in an amount suf-
ficient to inhibit gum formation.

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4. A motor fuel containing unsaturated
gum forming constituents and a phthalimi-
dine substance in an amount sufficient to in-
hibit gum formation.

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5. A cracked motor fuel containing
phthalimidine in an amount sufficient to in-
hibit gum formation.

6. A motor fuel containing unsaturated
gum forming constituents and phthalimidine
in an amount sufficient to inhibit gum forma-
tion.

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7. A cracked motor fuel containing hy-
droxyphthalimidine in an amount sufficient
to inhibit gum formation.

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8. A motor fuel containing unsaturated,
constituents and oxyphthalimidine in an
amount sufficient to inhibit gum formation.

9. A cracked motor fuel containing an N-

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substituted phthalimidine in an amount sufficient to inhibit gum formation.

5 10. A cracked motor fuel containing an N-substituted hydroxyphthalimidine in an amount sufficient to inhibit gum formation.

11. A cracked motor fuel containing a hydroxyalkyl N-substituted phthalimidine in an amount sufficient to inhibit gum formation.

10 12. A cracked motor fuel containing a hydroxyalkyl N-substituted hydroxyphthalimidine in an amount sufficient to inhibit gum formation.

15 13. A cracked motor fuel containing an aryl phthalimidine in an amount sufficient to inhibit gum formation.

14. A cracked motor fuel containing an aryl hydroxyphthalimidine in an amount sufficient to inhibit gum formation.

20 15. A motor fuel according to claim 1, in which the amount of the imidine substance does not exceed 1%.

25 16. A motor fuel according to claim 6, in which the amount of the phthalimidine does not exceed 1%.

17. A motor fuel according to claim 8, in which the amount of hydroxyphthalimidine does not exceed 1%.

30 18. A motor fuel according to claim 1, in which an antacid is present in addition to the imidine substance.

19. A motor fuel according to claim 6, in which an antacid is present in addition to the phthalimidine.

35 20. A motor fuel according to claim 8, in which an antacid is present in addition to the hydroxyphthalimidine.

40 21. A cracked motor fuel containing a material selected from a class consisting of phthalimidine, hydroxyphthalimidine, naphthalimidine, hydroxynaphthalimidine, succinimidine, hydroxysuccinimidine, ethylphthalimidine, ethylhydroxyphthalimidine, methanolphthalimidine and ethanolphthalimidine, the amount of the imidine substance being sufficient to inhibit gum formation and being approximately within the ratio of two pounds of imidine substance to 100 barrels of cracked gasoline to 1% of phthalimidine substance.

50 Signed at Pittsburgh, Pennsylvania, this 22nd day of July, 1931.

ALPHONS O. JAEGER.