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FUEL FOR INTERNAL-COMBUSTION ENGINES AND MOTORS.

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Our invention relates to fuels for internal combustion engines and particularly to the making of a preparation or composition to be added to ordinary liquid petroleum-product fuels, such as gasoline, to obtain a better, quicker and more complete combustion of such fuel with a corresponding increase in the efficiency of the engine or motor performance.

One object of our invention is to produce a composition, a small quantity of which, when added to the gasoline in the tank or reservoir of an internal combustion engine, will render the combustion of the fuel more perfect, instantaneous and complete.

A further object of our invention is to provide a composition which will energize or sensitize a petroleum-product fuel; will not attack, corrode or chemically react upon the metals of the fuel tank or the connections therefrom to the cylinder; which will prevent or reduce the knock in an internal combustion engine; will reduce the temperature at which the engine or motor will efficiently operate; will prevent the accumulation of carbon within the cylinder; and will eliminate rather slowly perhaps, any carbon which may have accumulated in the cylinder from the use of other or untreated fuels.

Other objects of our invention will appear in the specification below.

In carrying out our invention and in producing a fuel energizer or sensitizer, we add to a suitable petroleum composition, such as ordinary fuel gasoline, a suitable amount of ammonium-chlorid. The proportion of ammonium-chlorid to the gasoline or other petroleum-product fuel may vary, depending considerably upon the quality, kind or grade of the petroleum-product fuel used, but for ordinary fuel gasoline, the proportion of three pounds of ammonium-chlorid to a gallon of the gasoline will give good results. The ammonium-chlorid is preferably added to the gasoline to be treated in a closed agitating tank or container of any suitable construction, and the ammonium-chlorid and gasoline are thoroughly shaken or agitated together until all indication of chemical reaction have disappeared, which may be in about fourteen (14) hours. After such agitation, the mixture is allowed to settle and is then drawn off into a suitable settling tank.

To this mixture, compound or product then may be added zinc-sulphate, copper-sulphate and ammonium-hydroxid. The proportion of zinc-sulphate and copper-sulphate is small as compared to the quantity of gasoline or other petroleum product. The sulphates may be mixed with and dissolved in a small quantity of ammonium-hydroxid and added to the ammonium-chlorid-treated gasoline. The proportion of ammonium-hydroxid to the gasoline is about from substantially ½ of 1% to substantially 5%, and preferably about 1% by volume, but the proportion may be varied considerably depending somewhat on the grade of gasoline used.

After the sulphates of copper and zinc, and the ammonium-hydroxid have been thus added to the ammonium-chlorid-treated gasoline, the mixture is allowed to stand in the said settling tank for about twenty-four (24) hours during which time a dark precipitate, somewhat resembling "mother of vinegar" forms and settles to the bottom of the settling tank. After about twenty-four (24) hours all of the said precipitate, together with any excess of the ammonium-chlorid and of the sulphates, settle to the bottom of the tank, whereupon the clear liquid may be drawn off.

The material so drawn off may be added to a petroleum-product fuel for use in internal combustion engines, and the desired results above set forth may be obtained. A very small quantity of this liquid, for instance, about half an ounce of said liquid to a gallon of gasoline will be sufficient in most cases to greatly improve the combustion of the gasoline and to increase the efficiency of the engine or motor.

This composition may, however, be further improved by adding to it a small quantity of a common solvent of the petroleum product (e. g. gasoline) and of the alcohol, and at the same time or afterward, a suitable quantity of an alcohol may be added. The solvent of the petroleum product and of the alcohol may be ether or acetone or ethyl-acetate, or amyl-acetate. About one-half of one per cent of ether will be sufficient to render the alcohol thoroughly miscible in the petroleum composition. When acetone is used a somewhat larger proportion thereof will be necessary, but in any

case the quantity is very small. The proportion of alcohol to the gasoline is rather small. The amount of alcohol which may be added, may vary considerably, but we find that when about 3½% by volume of an alcohol is added, good results are attained.

When about one-half of an ounce of the above liquid is added to every gallon of gasoline or similar petroleum-product fuel to be treated, the fuel will be found to be greatly improved. The noticeable results are the decrease in the heat of the motor of from 20 to 40° F.; an increased mileage, in many instances up to or above a 30% increase over the mileage obtainable from the same quantity of untreated gasoline; a substantial saving in lubricating oil, due possibly to the fact that the engine runs at a lower temperature; the absence of any deposit of carbon in the cylinders; and the removal of any carbon deposit that may have been formed in the cylinders from the use of other fuels. But the removal of the deposited carbon is slow. Our new product is not a carbon remover per se, except that in producing perfect combustion of the fuel in the cylinder any carbon deposit already therein is slowly removed or loosened from the interior of the cylinder. When gasoline or similar fuels are thus treated with our new composition, and the carbureter is properly adjusted, perfect combustion will take place within the cylinder. No carbon monoxid will be formed because there is perfect or complete combustion of the fuel. The improvement in the fuel is particularly noticeable when a low grade gasoline is used, but it is marked even when the composition is added to a high grade gasoline.

Although we have described with particularity one way in which our process may be carried out and the quantity and materials which may be used, we do not wish to be construed as limited to the exact proportions nor to the exact sequence of steps herein above enumerated for we have found that the sulphates may be added at the same time that the ammonium-chlorid is added to the petroleum composition and that when the ammonium-hydroxid is afterwards added the final product is substantially the same as that first described. We therefore may regard the petroleum product, treated with ammonium-chlorid, and with the zinc and copper-sulphate as the main or essential base, part or portion of the final composition, because, after ammonium-hydroxid has been added thereto, and the precipitates have settled, the resulting compound or product will greatly improve, energize and sensitize a petroleum-product fuel, without producing any corrosion or decomposition of the metal of the tank or to the metal connections thereof.

But this final composition may be further improved by adding a small amount of an alcohol and a solvent in which the alcohol and the petroleum-product are soluble. Any of the following solvents, ether, acetone, amyl-acetate, ethyl-acetate may be used for this purpose.

We make no claim to any definite knowledge of the chemical reactions which take place in producing our fuel energizer or sensitizer. We do know that after such salts as the sulphates or chlorids of the metals used in fuel tanks and fuel tank connections (zinc, lead and copper) and the ammonium-hydrate are added to the ammonium-chlorid-treated gasoline, the ammonium-chlorid (sal ammoniac) will not attack the metal of the fuel tank or reservoir or the solder of the joints, the piping or other connections to the engine. We also know that by adding the solvent materials and the alcohol, a more perfect combustion is obtained than when an alcohol is added to a petroleum fuel without the acetone, ether or other solvent. The combustion of the fuel so treated is more complete and more instantaneous throughout.

Having thus described our invention, what we claim and desire to protect by Letters Patent of the United States is:

1. A composition for energizing and sensitizing petroleum fuels containing a petroleum product which has been agitated with ammonium-chlorid and to which has been added relatively small quantities of the sulphates copper and zinc.

2. A composition for energizing and sensitizing petroleum fuels comprising a petroleum product which has been agitated with ammonium-chlorid, to which has been added relatively small quantities of the sulphates of copper and zinc and ammonium hydroxid.

3. A composition for energizing and sensitizing petroleum fuels containing gasoline which has been agitated until the chemical reactions have been substantially completed with ammonium-chlorid, to which has been added a relatively small quantity of the sulphates of copper and zinc and ammonium-hydroxid.

4. A composition for energizing and sensitizing petroleum fuels for internal combustion engines comprising gasoline which has been thoroughly agitated with ammonium-chlorid and allowed to settle, the proportion of ammonium-chlorid to the petroleum being substantially 3 pounds of ammonium-chlorid to each gallon of gasoline to which has been added relatively small quantities of the sulphates of copper and zinc, and ammonium-hydroxid.

5. A composition for energizing and sensitizing petroleum fuels containing gasoline which has been thoroughly agitated with ammonium-chlorid, the proportions of the ammonium-chlorid to the gasoline being substantially 3 pounds of ammonium-chlorid

to each gallon of gasoline and to which has been added a relatively small amount of the sulphates of zinc and of copper.

6. A composition for energizing and sensitizing petroleum fuels containing gasoline which has been thoroughly agitated with ammonium-chlorid, the proportions being substantially 3 pounds ammonium-chlorid to each gallon of gasoline, to which has been added a relatively small amount of the sulphate of zinc and a sulphate of copper, and ammonium hydroxid.

7. A composition for energizing and sensitizing petroleum fuels containing gasoline which has been thoroughly agitated with ammonium-chlorid, the proportions being substantially 3 pounds ammonium-chlorid to each gallon of gasoline, to which has been added a relatively small amount of the sulphate of zinc and a sulphate of copper, and between substantially ½ of 1% and substantially 5% by volume of ammonium hydroxid.

8. A composition for energizing and sensitizing petroleum fuels containing a petroleum product which has been agitated with ammonium-chlorid to which has been added the sulphate of zinc and sulphate of copper, ammonium-hydroxid, and to which has also been added a substance miscible with an alcohol and with said petroleum product.

9. A composition for energizing and sensitizing petroleum fuels containing a petroleum which has been agitated with ammonium-chlorid to which has been added the sulphate of zinc and the sulphate of copper, ammonium hydroxid, and to which has also been added an alcohol and a liquid in which said alcohol and said petroleum product are miscible.

10. A composition for energizing and sensitizing petroleum fuels containing a petroleum which has been agitated with ammonium-chlorid to which has been added the sulphates of zinc and copper, ammonium-hydroxid and to which has also been added about ½ of 1% to 5% of an alcohol, and a substantially equal amount of a common solvent for the alcohol and for the petroleum product.

11. A composition for energizing and sensitizing petroleum fuels containing gasoline which has been agitated for about 14 hours with ammonium-chlorid in the proportion of substantially 3 pounds of ammonium-chlorid to each gallon of gasoline, to which has been added a small amount of the sulphates of zinc and copper, and a relatively small amount of ammonium hydroxid and to which has also been added a relatively small amount of an alcohol.

12. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together a petroleum fuel composition and ammonium-chlorid, transferring the agitated liquid to a settling tank and adding thereto a relatively small quantity of the sulphates of zinc and copper and ammonium hydroxid, allowing the liquid to stand and the precipitate to settle, and drawing off the clear liquid.

13. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together a petroleum fuel and ammonium-chlorid, transferring the agitated liquid to a settling tank and adding thereto a relatively small quantity of the sulphates of zinc and copper, and ammonium hydroxid, allowing the liquid to stand and the precipitates to settle, drawing off the clear liquid and adding thereto a solvent of the petroleum composition and of alcohol.

14. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together a petroleum composition and ammonium-chlorid, transferring the agitated liquid to a settling tank and adding thereto a relatively small quantity of the sulphates of zinc and copper, and ammonium hydroxid, allowing the liquid to stand and the precipitates to settle, drawing off the clear liquid, adding thereto an alcohol and a solvent of the petroleum composition and of the alcohol.

15. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together for about 14 hours gasoline and ammonium-chlorid, transferring the agitated liquid to a settling tank and adding thereto a relatively small quantity of the sulphates of zinc and of copper, and ammonium hydroxid, allowing the liquid to stand and the precipitates to settle, and then drawing off the clear liquid.

16. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together for about 14 hours gasoline and ammonium-chlorid, transferring the agitated liquid to a settling tank and adding thereto the sulphates of zinc and of copper.

17. The method of making an energizer and sensitizer for petroleum fuels which consists in agitating together for about 14 hours gasoline and ammonium-chlorid, the proportions being about 3 pounds of ammonium-chlorid to each gallon of gasoline, transferring the agitated liquid to a settling tank and adding thereto a relatively small quantity of the sulphates of zinc and copper, and ammonium hydroxid, the proportion of ammonium hydroxid to the gasoline being substantially from ½ to 1% to substantially 5% by volume, allowing the liquid to stand and the precipitate to settle, and drawing off the clear liquid.

18. The method of making an energizer and sensitizer for petroleum fuels which consists in thoroughly agitating together gasoline and ammonium-chlorid, the propor-

tions being about 3 pounds of ammonium-chlorid to each gallon of gasoline, transferring the agitated liquid to a settling tank and adding thereto a common solvent of gasoline and alcohol.

19. The method of making an energizer and sensitizer for petroleum fuels which consists in thoroughly agitating together gasoline and ammonium-chlorid, the proportions being about 3 pounds of ammonium-chlorid to each gallon of gasoline, transferring the agitated liquid to a settling tank and adding thereto an alcohol and a solvent for gasoline and the alcohol.

In witness whereof, we have hereunto set our hands this ninth day of May, 1924.

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