Patented Aug. 25, 1931 1,820,395

# UNITED STATES PATENT OFFICE

WHEELER G. LOVELL AND THOMAS A. BOYD, OF DETROIT, MICHIGAN, ASSIGNORS TO GENERAL MOTORS RESEARCH CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE

## METHOD AND MEANS FOR REMOVING CARBON DEPOSITS

No Drawing. Application filed August 28, 1929. Serial No. 389,085.

This application relates to the removal of carbon deposits from the combustion chambers of internal combustion engines, and its principal objects are to employ compounds particularly suitable for this purpose and a process adapted to employ these compounds at their highest efficiency.

We have found that cyclic alcohols such as the aromatic alcohols including benzyl alcohol and cinnamyl alcohol, the cyclic alcohols such as cyclohexanol and furfuryl alcohol, and the terpene alcohols such as terpineol, which will remove varnish are particularly useful in removing carbon deposits and that the best method of using them is to apply them to carbon coated parts which have been heated preferably to a temperature above 150° F., the optimum conditions for water cooled engines being at approximately the boiling point of water. We may also use with cyclic alcohols a mixture of benzol and alcohol, or other low boiling varnish remover, which apparently increases the solvent action of these cyclic alcohols not only by reducing the viscosity, but also because they are lower boiling and tend to keep the liquid in contact with the carbon in a mild state of agitation.

As a specific example we may use in each cylinder of an ordinary six cylinder engine 30 c. c. of a mixture comprising by volume 40 parts of benzyl alcohol, 30 parts benzol, and 30 parts of ethyl alcohol. The engine is operated until the temperature of the metal parts of the combustion chamber is at least 150° F. when the mixture is injected or otherwise introduced into the cylinders and the engine stopped. The mixture is permitted to remain in the cylinders for about two hours, more or less, depending upon the nature of the carbon deposit, during which time the gummy binder is softened or dissolved. Then the engine is started and the loosened deposit is gradually blown out the exhaust.

When cleaning the parts by hand they may be heated, the solvent applied, and when the binder is softened the deposit may be wiped off.

It is within the scope of the present invention to employ any cyclic alcohol which is a varnish remover and to vary the proportions acccording to the compound used and the specific conditions, and the cyclic alcohol may be used alone.

We claim:—

1. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises applying to the carbon deposit a cyclic alcohol which is a varnish remover, and removing the carbon deposit.

2. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises applying to the carbon deposit benzyl alcohol, and removing the carbon deposit.

3. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises heating the coated parts, applying to the carbon deposit a cyclic alcohol which is a varnish remover, and a low boiling varnish remover, and removing the carbon deposit.

4. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises heating the coated parts to above 150° F., applying to the carbon deposit a cyclic alcohol which is a varnish remover, benzol and alcohol, and removing the carbon deposit.

5. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises applying to the carbon deposit an aromatic alcohol which is a varnish remover, and removing the carbon deposit.

6. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises heating the coated parts, applying to the carbon deposit an aromatic alcohol which is a varnish removed, and a low boiling varnish remover, and removing the carbon deposit.

7. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises heating the coated parts to above 150° F., applying to the carbon deposit an aromatic

alcohol which is a varnish remover, benzol and alcohol, and removing the carbon deposit.

8. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises heating the coated parts, applying to the carbon deposit benzyl alcohol, and benzol and alcohol, and removing the carbon deposit.

9. A composition of matter for removing carbon deposits from internal combustion engines comprising a cyclic alcohol which is a varnish remover, and a low boiling varnish remover.

10. A composition of matter for removing carbon deposits from internal combustion engines comprising an aromatic alcohol which is a varnish remover, and a low boiling varnish remover.

11. A composition of matter for removing carbon deposits from internal combustion engines comprising a cyclic alcohol which is a varnish remover, benzol and ethyl alcohol.

12. A composition of matter for removing carbon deposits from internal combustion engines comprising an aromatic alcohol which is a varnish remover, benzol and ethyl alcohol.

13. A composition of matter for removing carbon deposits from internal combustion engines comprising benzyl alcohol, benzol and ethyl alcohol.

14. The process of removing carbon deposits from the combustion chamber of an internal combustion engine which comprises applying to the carbon deposit furfuryl alcohol, and removing the carbon deposit.

In testimony whereof we affix our signatures.

WHEELER G. LOVELL.
THOMAS A. BOYD.