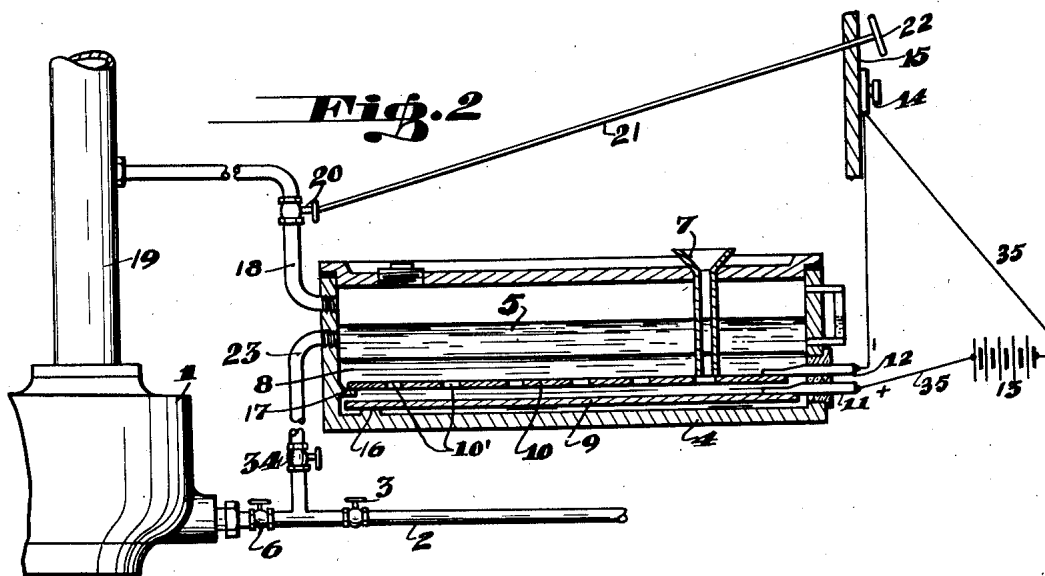
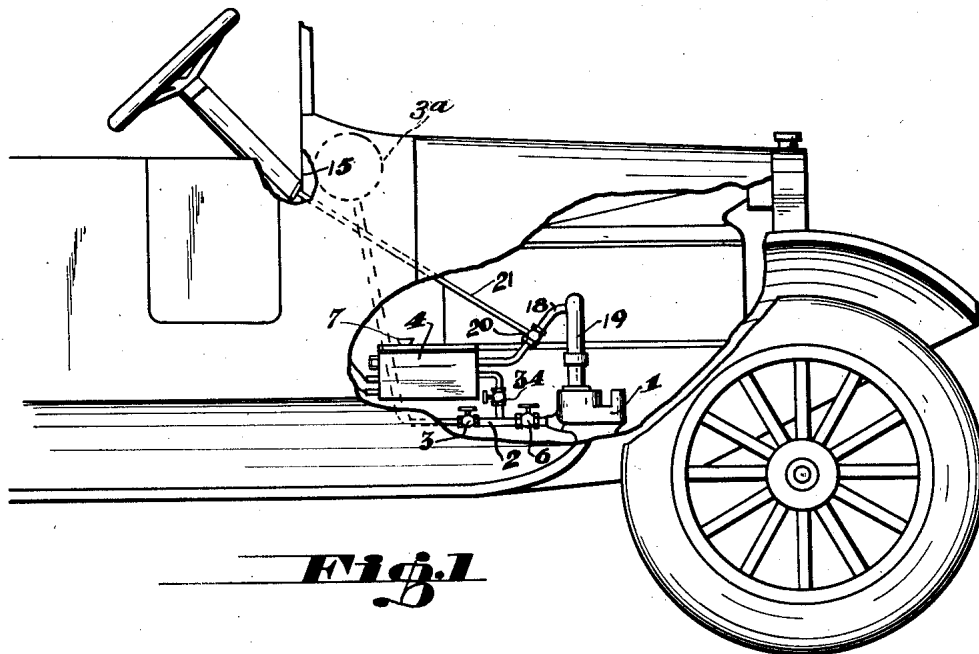


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 PROCESS AND APPARATUS FOR GENERATING EXPLOSIVE GASES.
 APPLICATION FILED JUNE 11, 1920.

1,379,077.

Patented May 24, 1921.



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PROCESS AND APPARATUS FOR GENERATING EXPLOSIVE GASES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY BLUMENBERG, Jr., a citizen of the United States, residing at Daggett, in the county of San Bernardino and State of California, have invented new and useful Improvements in Processes and Apparatus for Generating Explosive Gases, of which the following is a specification.

My invention relates to a process and apparatus for generating combustible gases especially adapted for internal combustion engines.

Attempts have been made to use the heavier grades of hydrocarbon fuel, such as engine distillate, kerosene, and the like, but their use is invariably accompanied by the excessive deposit of carbon in the engine. Furthermore, varying amounts of the heavy hydrocarbon fuels are condensed in the explosive chamber and find their way into the lubricating oil in the crank case, which is objectionable.

It is an object of this invention to use heavy hydrocarbon fuels such as distillate, kerosene, and the like, but to modify the same in a manner to avoid the deposit of carbon within the engine, at the same time generating a gaseous fuel which is easily exploded and compares well with the fuel produced by the best grade of gasoline.

I have attained this object by passing electrolytically generated gases, hydrogen and oxygen, through a heavy fuel, whereby the heavy fuel is physically modified by the solution of a large volume of hydrogen, which subsequently facilitates the vaporization and adds to the explosive qualities of the gaseous vapor and also directly modifies the chemical composition of the heavy fuel itself by the chemical reaction taking place between the fuel and the electrolytically generated gases.

My invention consists in the steps of the process and the apparatus for carrying out my process hereinafter described and claimed.

In the accompanying drawings which form a part of this specification,

Figure 1 is a sectional view of an automobile having parts broken away to show the application of my invention to the fuel gaseous vapor producing apparatus of the engine.

Fig. 2 is a cross sectional view of the apparatus proper for treating the heavy hy-

drocarbon fuel, shown connected to the carbureter and other parts of the engine.

Referring to the drawings, 1 indicates a carbureter of any suitable type connected with a pipe line 2 leading to a heavy fuel tank, shown in dotted lines at 3^a; 3 and 6 are valves in pipe line 2; 4 is a closed vessel for the reception of a heavy hydrocarbon fuel 5 such as engine distillate or kerosene. 7 is a funnel-shaped filling pipe passing through the top of the vessel 4, the lower end of said filling pipe 7 being spaced from the bottom thereof. The filling pipe 7 is used for introducing a suitable quantity of an electrolyte such as a solution 8, either acid, alkaline or neutral. In practice the electrolyte employed may be ammonium nitrate. The electrolyte is for use in generating hydrogen and oxygen which passes through the supernatant layer 5 of the heavy fuel. Electrodes 9 and 10 horizontally disposed and slightly spaced from each other within the electrolyte 8 are connected to the positive and negative poles 11 and 12, respectively, which, in turn, are connected to a storage battery 13, or any other source of electric energy, by means of conductors 35. The current from the storage battery leading to the electrodes 9 and 10 may be controlled by a switch conveniently arranged on the dash board 15 within reach of the operator. 16 and 17 are supports for the outer ends of the electrodes 9 and 10, respectively. A pipe 18 leads from the upper part of the vessel 4 to the intake manifold 19 conducting the gaseous fuel to the explosion chambers. The pipe 18 is controlled by means of a valve 20 operated by a rod 21 passing through the dash board 15 and provided with an operating handle 22. Another pipe 23 leads from the layer of heavy fuel to the pipe line 2, joining the same between valves 3 and 6, and is provided with a valve 34.

In the operation of my apparatus a suitable electrolyte, as above referred to, is introduced through the funnel-shaped pipe 7 of a quantity sufficient to cover the electrodes 9 and 10, then the heavy fuel as above referred to is introduced, and being lighter than the electrolyte will form a supernatant layer thereon. The valve 3 in pipe line 2 is closed. By closing the switch 14 current is passed between the electrodes 9 and 10, the upper electrode 10 being shown as provided with perforations 10' to evenly

distribute the gases generated, which will pass upwardly through the heavy fuel 5. It should be noted that the gases thus generated are in *statu nascendi* and are therefore especially active in effecting chemical reactions.

The heavy fuel will dissolve large quantities of hydrogen and varying quantities of oxygen. Kerosene for instance will absorb as much as 65 volumes of hydrogen to 100 volumes of kerosene at ordinary temperatures. The excess of hydrogen will pass through pipe 18 to the manifold 19 and will give an exceedingly explosive gaseous mixture excellent for starting in the coldest weather.

The gaseous mixture of oxygen and hydrogen will contain vapors of light hydrocarbons which are formed by the reaction of the hydrogen during its passage through the heavy fuel 5. The physical qualities of the heavy fuel are changed, due to the absorption of large volumes of hydrogen, lowering its specific gravity and making the same more volatile within the carbureter. Furthermore, chemical changes take place, the hydrogen reacting with the hydrocarbons and producing the lower more volatile members of the hydrocarbon series.

When it is desired to replenish the supply of heavy fuel the valve 6 is closed and valve 3 is opened, allowing the fuel from the supply tank (not shown) to flow into the vessel 4, and by closing the valve 3 and opening the valve 6 the apparatus is again in normal working condition, the electrolyte being from time to time replenished through the filler pipe 7. It will be understood that electrolyte may be introduced by other convenient means or provision may be made for keeping the vessel 4 filled with electrolyte and heavy fuel by means of float chamber devices, as will be understood.

By my treatment of the heavy fuel, as explained above, I may utilize the grades of fuel which at the present time are unsuit-

able for internal combustion engines for motor vehicles, by producing a gaseous fuel mixture which is highly explosive and which does not deposit carbon in the combustion chamber.

Various changes may be made without departing from the spirit of the invention as claimed.

What is claimed is:

1. A process of producing a gaseous fuel mixture, comprising treating heavy hydrocarbons with hydrogen by passing a mixture of hydrogen and oxygen electrolytically generated through the body of the heavy hydrocarbons.

2. An apparatus for producing a gaseous fuel vapor, comprising a closed tank, means at the bottom of the tank for generating electrolytically evolved hydrogen and oxygen, means under the control of the operator for controlling said electrolytic means, a passage leading from said tank to the manifold of an internal combustion engine, means under the control of the operator for controlling said passage, and another passage leading from said tank for conducting hydrocarbons to the carbureter.

3. An apparatus for producing a gaseous fuel vapor, comprising a closed tank, a pair of horizontally disposed electrodes in the bottom of said tank, the upper of said electrodes being perforated, a source of electricity connected to said electrodes, means for controlling said source of electricity, a conduit leading from the upper part of said tank for conducting off the gases and vapors, a conduit leading from a point intermediate the top and bottom of said tank to conduct liquid fuel, means for supplying a hydrocarbon to said tank, and means for supplying an electrolyte to cover said electrodes.

In testimony whereof I have signed my name to this specification.

HENRY BLUMENBERG, JR.