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GAS GENERATOR

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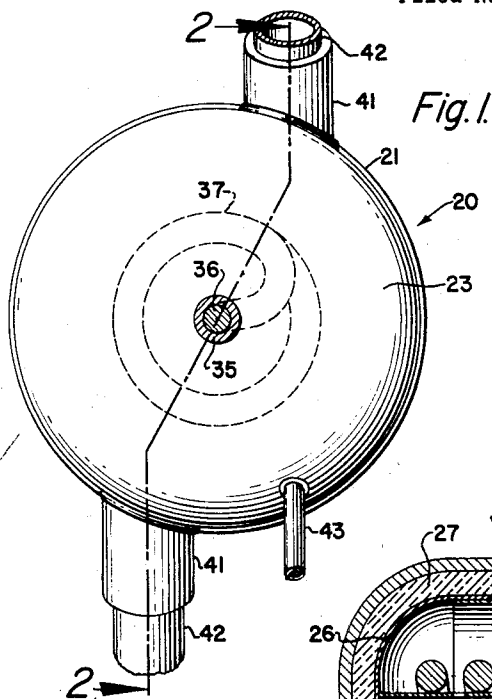


Fig. 1.

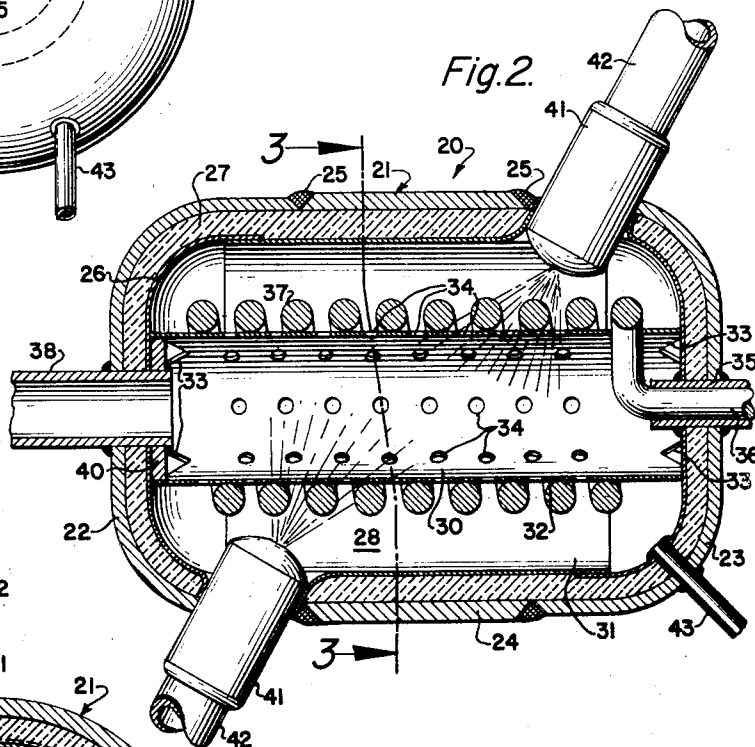


Fig. 2.

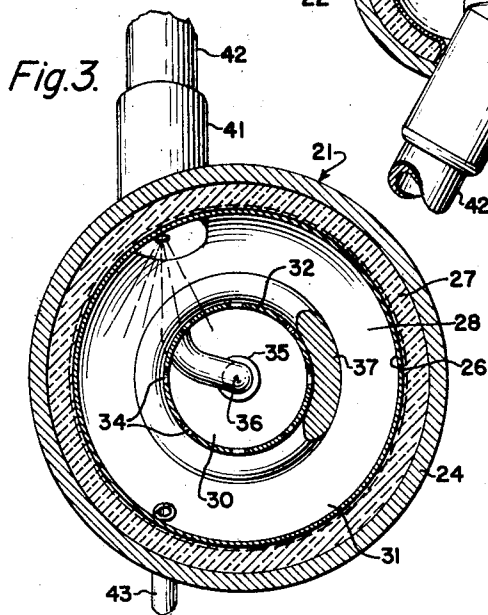


Fig. 3.

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2,925,329

GAS GENERATOR

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1 Claim. (Cl. 23—281)

This invention relates generally to apparatus for converting liquid fuel to gas and is more particularly directed to reaction chamber means for decomposing a fuel, such as ethylene oxide, to provide a gas for use in operating a turbine or similar equipment with a minimum formation of carbon particles.

An object of this invention is to provide a gas generator having means forming a closed chamber provided with an internal heating element and means for spraying fuel into the chamber in a particular manner which facilitates the conversion of fuel into gas and at the same time prevents the accumulation of carbon on structure within the chamber, the latter having an outlet for the gas following generation thereof within the chamber.

Another object of the invention is to provide a gas generator having means forming chamber sections separated by a perforated partition, one of the chamber sections having a heating element and means for introducing fuel in a particular manner to cause the rapid and complete conversion of fuel into gas, the other of the chamber sections communicating with a chamber outlet through which gas generated in the chamber will flow to a point of use.

A further object of this invention is to provide a gas generator having a reaction chamber of generally cylindrical formation which is divided by a tubular element into inner and outer chamber sections, one of the sections being provided with a heating element and fuel nozzles disposed to direct fuel spray against the heating element and into the chamber section to cause continuous movement of the fuel and prevent the formation of carbon deposits, the gas generated flowing through openings in the tubular element to the other chamber section and outwardly through an outlet leading therefrom.

A still further object of the invention is to provide a gas generator of the type mentioned in the preceding paragraph in which the fuel nozzles are arranged to direct fuel spray tangentially into one of the chamber sections and generally longitudinally thereof, the fuel nozzles being disposed on opposite sides of the chamber and directed toward opposite ends whereby a fuel flow pattern which increases the efficiency of the device will be secured.

Another object of the invention is to provide a gas generator having a hollow, internally insulated, generally cylindrical body divided by a longitudinally extending tubular element into concentric sections communicating with one another through openings spaced longitudinally of the tubular element, the body having nozzles for directing fuel into the outer section along paths which provide for a most intimate and efficient heat exchange with a heating element coiled around said tubular element in the outer chamber section, an outlet for the gases generated leading from the inner chamber section at one end of the body.

Other objects and advantages will be made apparent by the following description and the accompanying drawing in which one embodiment of the invention has been illustrated.

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In the drawing:

Figure 1 is an elevational view of one end of a gas generator formed in accordance with the present invention;

Figure 2 is a longitudinal sectional view taken through the gas generator on staggered planes indicated by the broken line 2—2 of Fig. 1;

Figure 3 is a vertical, transverse sectional view of the device taken on the plane indicated by the line 3—3 of Fig. 2.

Referring more particularly to the drawing, the numeral 20 designates the complete gas generator. This device, in the form illustrated, includes a closed cylindrical body 21 which in the present instance is fabricated from a plurality of pieces. Two cup shaped end pieces 22 and 23 may be formed in any suitable manner such as by stamping, spinning, turning or casting, depending upon the material from which the pieces are formed. The third piece designated by the numeral 24 is tubular in form, the pieces being welded, as indicated by the numeral 25, into a unit. The body also includes an inner liner 26 which may be formed of sheet metal or other suitable material, this inner liner being spaced from the body 21 by a suitable insulating material 27.

The body 21 provides an internal chamber 28 which is also cylindrical in form and is closed at its ends by the end walls of the body. This chamber is divided into inner and outer sections 30 and 31 by a tubular partition 32, this partition also being formed of suitable material which will resist the high temperatures of the gas combusted in the chamber. In the form of the invention illustrated, the chamber sections 30 and 31 are concentric and communicate with one another through spaced openings 33 and 34 formed in the partition.

One end wall 23 is provided with a central opening through which a tube 35 extends, this tube receiving a lead-in conductor 36 which is employed to transmit electrical current to a heating element 37 coiled around the partition 32. This coiled heating element extends substantially the full length of the chamber and may be secured in any desirable manner to the partition.

Openings 34 in the partition are disposed between the convolutions of the heating coil. Openings 33 are arranged at the ends of the heating coil, sufficient openings being provided to permit gas flow from the outer to the inner chamber section without impedence. End wall 22 is also provided with a central opening in which an outlet duct 38 is secured, a washer 40 being welded to the inner end of the duct and the partition. The duct 38 is also welded to the end wall at the outer side thereof. This connection prevents gas leakage between the duct and the body.

The body is also provided with a plurality of fuel inlet nozzles 41, these elements also being welded to the outer pieces of the body. Suitable pipes or tubes 42 conduct liquid fuel to the nozzles 41. These nozzles, as shown in Figs. 1 and 3, are arranged to direct the fuel issuing therefrom substantially tangentially into the outer section 31 of the chamber 28. The nozzles are also arranged on opposite sides of the body and on opposite sides of a plane extending substantially parallel to the axes of the nozzles and through the longitudinal axis of the body so that the streams of fuel issuing therefrom will flow around the heating coil in the outer chamber section in the same general direction. The nozzles are located in such a manner also that part of the fuel sprayed therefrom will strike the heating element. It will be noted from Fig. 2 that the axes of the nozzles are tilted in a manner to cause the streams issuing therefrom to be directed in generally longitudinal directions and toward opposite ends of the chamber, this arrangement serving to lengthen the path of flow of the fuel, thus prolonging the period in which the

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gas remains in the outer chamber section subject to the heat radiating from the heating element. As the fuel reacts and forms gas, the gas flows through the openings in the partition to the inner chamber section and outwardly through the conduit 38 to the point of use. The engagement of part of the fuel flowing into the chamber under pressure with the heating element tends to minimize the formation of carbon on the heating element. The flow of gas through the openings in the partition also tends to prevent the accumulation of carbon at these points.

As illustrated in Fig. 2, the end section 23 also is provided with a tube 43 through which gas pressures and temperatures may be measured. The tube 43 may be omitted without affecting the operation of the device.

I claim:

A gas generator comprising a body forming a chamber;

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a tubular member extending longitudinally of the chamber and dividing it into inner and outer sections, the inner and outer sections communicating through a plurality of perforations in the tubular member; an electric heating coil surrounding and supported by the tubular member, the perforations being disposed between the convolutions of the heating coil; a gas outlet extending axially from the inner section; and means carried by the body for spraying fuel into the chamber in oppositely directed paths extending generally tangentially to and lengthwise of the chamber.

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