

A. W. SOUTHEY.
 APPARATUS FOR THE PRODUCTION OF GASEOUS FUEL.
 APPLICATION FILED AUG. 19, 1912.

1,068,708.

Patented July 29, 1913.

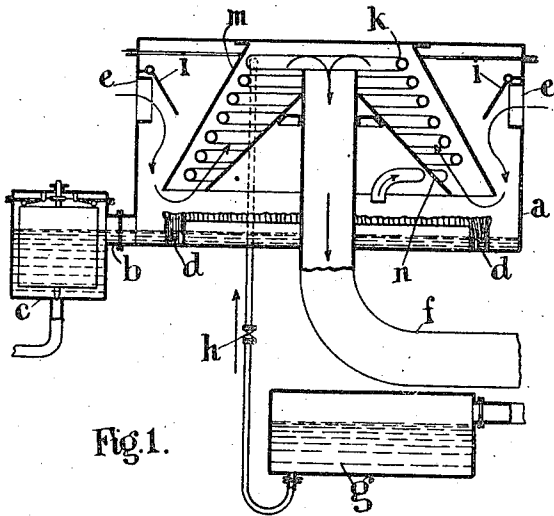


Fig. 1.

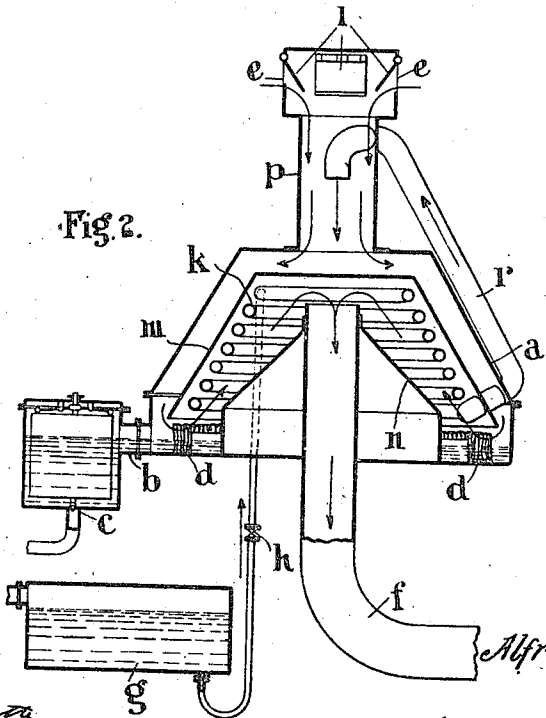


Fig. 2.

Witnesses

H. C. Robinson
G. M. Struett

Inventor

Alfred W. Southey

by

Langens. Lushman & Co

Attorneys

UNITED STATES PATENT OFFICE.

ALFRED WILLIAM SOUTHEY, OF MILL HILL, LONDON, ENGLAND.

APPARATUS FOR THE PRODUCTION OF GASEOUS FUEL.

1,068,708.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed August 19, 1912. Serial No. 715,844.

To all whom it may concern:

Be it known that I, ALFRED WILLIAM SOUTHEY, a subject of the King of Great Britain and Ireland, residing at Cherry House, Hale Lane, Mill Hill, London, England, have invented new and useful Improvements in Apparatus for the Production of Gaseous Fuel, of which the following is a specification.

This invention relates to the production from petroleum and other heavy oils of a gaseous fuel for use with internal combustion engines.

The gaseous fuel may be produced in apparatus of the type wherein the heat generated by partial combustion of a portion of the oil fuel is used to vaporize the fuel and to gasify it effectually.

The object of the invention is to reduce the amount of fuel consumed in obtaining a combustible gaseous mixture, by first raising the temperature of the original fuel to a much higher point than has hitherto been proposed, and at the same time I insure that should any unfixed vapor be present it shall have been heated to so high a temperature as will prevent condensation in the engine cylinders. By vaporizing the fuel, for example by passing it through a heated coil, before it reaches the point where combustion takes place, the heat required for effecting fixation of the vapor is obtained at the expense of less fuel than heretofore.

According to the present invention the operations of vaporization and combustion of the fuel are not allowed to proceed at the same point and practically simultaneously as is the case where the liquid fuel in a trough is ignited, and the fuel vaporized by the heat of combustion is immediately subjected to combustion at the point of vaporization, but the operations of vaporization and combustion are caused to proceed separately in the order named.

The invention accordingly consists in a method of producing gaseous fuel from liquid fuel by first vaporizing the same without combustion, admixing the vapor produced with a limited quantity of air, and then effecting partial combustion of this mixture so as to produce fixation.

The operation of fixation is facilitated by pre-heating the fuel whether in the liquid or other state, before it reaches the point where combustion takes place, by means of suitable heated surfaces, mixing it with air

at substantially atmospheric pressure, and fixing it by means of a flame, which, being more concentrated and of higher local temperature, effects the fixation of the oil vapor passing through it.

The invention also consists in effecting this pre-heating in a coil which acts somewhat like a flash boiler and is heated by the fixative flame.

The invention further consists in the improved oil gas generator hereinafter described.

Referring now to the accompanying drawings:—Figures 1 and 2 show diagrammatically in vertical section two forms of an oil gas generator according to the present invention.

According to the arrangement shown in Fig. 1, the generator comprises a cylindrical vessel, *a*, in which the pre-heating of the oil and the subsequent fixation of the vapor is effected. The oil for supplying the heat necessary for this purpose is supplied to the vessel *a*, from a conduit *b*, controlled by a float regulated needle valve *c*, of the ordinary type, and is burned in an annular wick *d*, preferably of asbestos, supported between two concentric rings *d*¹, *d*², fastened on the bottom of the vessel *a*.

Air inlets *e*, controlled by suitable non-return valves *i*, such as of the type illustrated, admit the air necessary for supporting combustion of the oil burning in the wick, the products of combustion thereby produced being withdrawn from the vessel *a*, through a delivery pipe *f*, connected with the suction of the engine to be supplied with the gaseous fuel.

The oil, such as paraffin, from which the gaseous fuel is to be produced, is preferably stored under pressure in a reservoir *g*, in a well-known manner, and by means of a conduit controlled by a valve, *h*, is delivered into a pre-heating coil, *k*, situated within the vessel *a*, in such a position that it is exposed to the hot products of a fixative combustion which takes place in the region above the wick *d*. In order to concentrate such products in the neighborhood of the pre-heating coil, *k*, the former are passed through a restricted space between two concentrically arranged baffles, *m* and *n*, here shown as of frusto-conical shape, the outer one *m* of which deflects the course of the air admitted through the inlets *e*, and causes it to flow over the wick *d*, and thereafter

produce a zone of maximum temperature at the place where the products of combustion are concentrated in the restricted space between the baffles *m* and *n*. The coil *k* may if desired be in contact with the outer baffle *m*. The products of combustion thus effectually heat the pre-heating coil *k*, in passing through which the oil is vaporized and delivered, in the form of the invention shown in Fig. 1, into the space within the annular wick *d*, as a super-heated vapor. The suction of the engine through the pipe *f* then withdraws such oil vapor which with the air admitted through the inlets *e* passes through the zone of maximum temperature between the baffles *m* and *n*, where the vapor is converted into a fixed gas which passes with the air and products of combustion to the delivery pipe, *f*. The flame burning near the wick *d* thus pre-heats the fuel and at the same time effects the fixation of the vapors produced by such pre-heating.

The wick is necessary to supply oil vapor to enable the fixative flame to be initiated, but afterward it is unimportant whether oil be supplied to the wick or not as the vapor coming from the coil will itself maintain the fixative flame.

According to the modified arrangement shown in Fig. 2, air is admitted to the generator vessel *a*, by inlets *e*, near the top of a funnel *p*, extending above the outer baffle *m*, such inlets being as before controlled by non-return valves *i*. The oil is fed into a pre-heating coil *k*, and the vapor formed therein is conducted by a pipe *r*, situated either outside or within the vessel *a*, into the passage between the outer baffle *m*, and the walls of the vessel *a*, where the oil vapor meets the air admitted by the inlets *e*. The oil vapor and air then pass downward, under the baffle *m*, and through the zone of maximum temperature between the outer and inner baffles *m* and *n*, where fixation of the vapor is effected previous to the gaseous fuel being delivered to the outlet pipe *f*. Such an arrangement has the advantage that the oil vapor issuing from the coil *k*, impinges upon the hot baffles, and any oil which may come over unvaporized is immediately converted into vapor on contacting with the baffles and is in many cases super-heated before reaching the zone where fixation is effected. The baffles therefore form a part of the surfaces which effect the vaporization of the fuel, and at the same time the pre-heating of the air forming part of the combustible mixture. Obviously such heating surfaces need not be in the form of a coil and baffles, but may take any other form which offers a large heating surface to the fuel and air if necessary.

If desired, the oil may be fed into the generator under pressure from a pump, or if preferred by the suction of the engine,

both forms being well known, the supply of oil being regulated so as not to exceed that required by the engine and fixative flame.

Other modification may be made in the details of the apparatus according to the present invention without departing from the spirit of the invention.

What I claim as my invention is:—

1. An apparatus for producing gaseous fuel from liquid fuel comprising means wherein the liquid is vaporized without combustion and without the presence of air, a receptacle having separate inlets for air and for all of said vapor in which receptacle said vapor and air are mixed and then fixed by partial self-combustion, and an outlet from said receptacle for said fixed gas.

2. An apparatus for producing gaseous fuel from liquid fuel comprising means wherein the liquid fuel is vaporized without combustion and without the presence of air, a receptacle having separate inlets for air and for all of said vapor in which receptacle said vapor and air are mixed and then fixed by partial self-combustion, and means for directing the hot fixed gas over the means containing the liquid fuel to vaporize said liquid fuel.

3. An apparatus for producing gaseous fuel from liquid fuel comprising means wherein the liquid fuel is vaporized without combustion and without the presence of air, a receptacle wherein all of said vapor is mixed with air at substantially atmospheric pressure, means in said receptacle for producing a flame, and means for directing the mixture through said flame to be fixed by partial self-combustion.

4. An apparatus for producing gaseous fuel from liquid fuel comprising a heating means, surfaces heated by said means over which said liquid fuel passes without self-combustion and free from the presence of air, whereby said fuel is vaporized, and a receptacle wherein all of said vapor is mixed with air and the mixture afterward subjected to partial combustion by the same heating means used to vaporize said fuel.

5. An apparatus for producing gaseous fuel from liquid fuel comprising a coil heated by a flame through which said fuel passes to be vaporized, and a receptacle wherein said vapor is afterward mixed with air at substantially atmospheric pressure, and means for directing all of said mixture openly through the flame by which said coil is heated and the mixture fixed by partial combustion.

6. An apparatus for producing gaseous fuel for internal combustion engines from liquid fuel comprising a casing, a mixing receptacle in said casing, means in said receptacle for producing a flame, a coil of pipe adapted to be heated by said flame, into one end of which coil liquid fuel is fed and

from its opposite end the vapor generated escapes into the mixing receptacle, means for supplying air at normal pressure to mix with said vapor, and means for causing said mixture to pass through the coil heating flame and be partly consumed and fixed.

7. An apparatus for producing gaseous fuel for internal combustion engines from liquid fuel, comprising a coil open at one end, into the opposite end of which liquid fuel is supplied without air, means for heating the coil to vaporize the liquid fuel which escapes through the open end, an air supply, and means for obtaining a concentrated zone of flame through which the vaporized fuel and air are drawn by the suction of the engine.

8. An apparatus for producing gaseous fuel for internal combustion engines from liquid fuel comprising a coil into which the fuel is fed and vaporized, and from which it escapes through one end, means for heating the coil, an air inlet, and a baffle adapted to deflect the air entering to mix with vaporized fuel beneath the coil and be carried through the heating means to be partly consumed and fixed.

9. An apparatus for producing gaseous fuel for internal combustion engines from

liquid fuel, comprising a casing, a tubular coil into which liquid fuel is fed without air and vaporized and from one end of which said vapor escapes, a fuel supply, an air inlet through which air enters the casing to mix with said vapor and be partly consumed, and baffles on the inside and outside of said coil to direct the flame of said burning mixture onto the coil and heat it.

10. An apparatus for producing gaseous fuel for internal combustion engines from liquid fuel, comprising a casing, a tubular coil therein in which said liquid fuel is vaporized, a fuel supply to said coil, a trough below said coil, a separate fuel supply to said trough, a wick in said trough for producing a flame to initially heat said coil, an air inlet to the casing through which air enters and mixing with said vapor, the mixture is partly consumed and the gas fixed, baffles on the inside and outside of said coil to direct the flame onto the coil, and an outlet to the engine leading from the space between said baffles.

ALFRED WILLIAM SOUTHEY.

Witnesses:

**JOSEPH WILLIAM THOMPSON,
G. W. BRIDGES.**