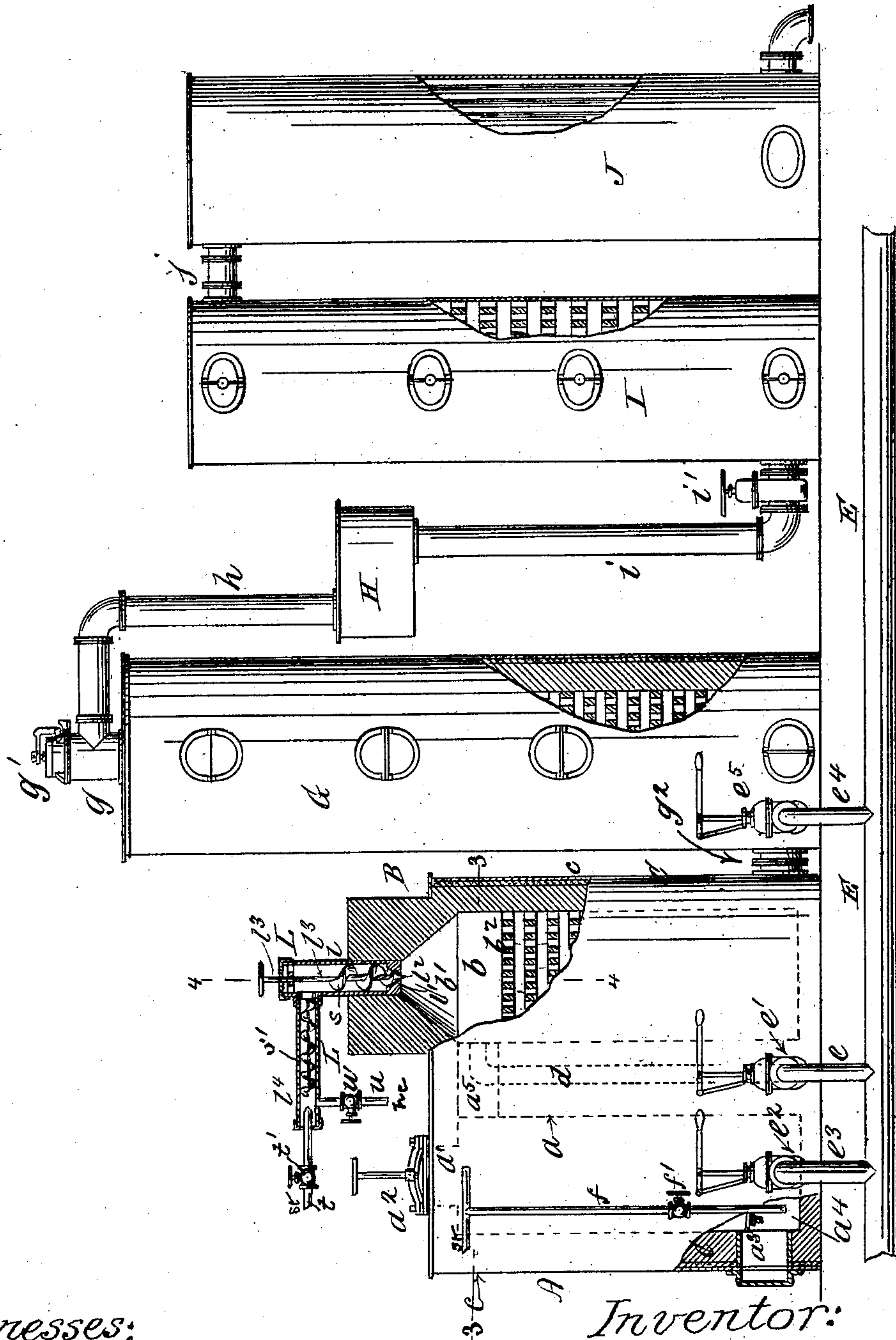


No. 890,940.

PATENTED JUNE 16, 1908.

A. M. SUTHERLAND.
GAS APPARATUS.
APPLICATION FILED DEC. 24, 1906.



Witnesses:
Myron G. Cleas.
W. C. Lawson

Inventor:
Alexander M. Sutherland
By J. Walter Fowler
his atty

UNITED STATES PATENT OFFICE.

ALEXANDER M. SUTHERLAND, OF ORANGE, NEW JERSEY.

GAS APPARATUS.

No. 890,940.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed December 24, 1906. Serial No. 349,272.

To all whom it may concern:

Be it known that I, ALEXANDER M. SUTHERLAND, a subject of the King of England, residing in Orange, Essex county, and State of New Jersey, have invented certain new and useful Improvements in Gas Apparatus, of which the following is a specification.

My improvements relate to apparatus designed for the manufacture of so called water gas in which the decomposition of steam is an essential feature, and the invention consists in the special construction and arrangement of parts hereinafter described and claimed specifically.

In the accompanying drawings, the figure is a diagrammatical view in sectional elevation of my improved apparatus and connections.

The generator chamber *a*, of the cupola A, and the mixing and fixing chamber *b*, of the carbureter B, are formed in a common, continuous casing C of suitable refractory material incased in a gas-tight covering *c*. In this casing C between the two said chambers is a conduit *d*, communicating at its upper end with the upper part of the carbureter chamber *b*, and at its lower extremity with the main air pipe E, through the medium of the branch pipe *e*, and the valve *e'*.

The cupola is provided at top with the usual fuel supply opening *a'*, closed by a sealing cap *a''*, and with the customary grate *a'''*, and ash pit *a''''*.

The usual provision is made for injecting steam into the incandescent fuel in the cupola, as by the pipe *f*, and valve *f'*. Excepting that the cupola is incorporated in a single continuous casing C, of refractory material with the carbureter B, it is of ordinary and well known construction, and does not differ in function or operation from those heretofore used. The upper part of the generator chamber *a*, communicates with the upper part of the carbureter chamber *b*, through a passage or flue *a''''*, just below the truncated conical concave dome *b'*, of said carbureter chamber, and above the tiers of checkers or bricks of refractory material *b''*, which are cross laid and spaced to form interstices for the tortuous passage of the gases in a manner well known.

Communicating with the ash pit *a''''*, of the cupola A, is an air valve *e''*, interposed between it and the branch *e''*, of the main air pipe E. Another branch air pipe *e'''*, and another valve *e''''*, connect the main air pipe E,

with the lower part of a superheater G of any desired or well known construction, provided at top with the usual relief pipe *g*, and cap *g'*. This superheater G communicates near its base with the lower part of the carbureter B through the conduit *g''*, the pipe *g*, being in turn connected by the pipe *h*, with the washer H, which is connected by the conduit *i*, and valve *i'*, with the scrubber I, connected in turn by the pipe *j*, with the condenser J,—said superheater G washer H, scrubber I, and condenser J, forming however no part of my present invention.

Provision is made for injecting steam vaporized hydro-carbon into the upper part of the carbureter chamber *b*, and for this purpose I prefer the specific form of injector and atomizer L, herein shown, or one essentially like it, in which the steam and hydro-carbon are caused to traverse a spiral passage which insures their intimate admixture and the reduction or separation of the liquid hydro-carbon into molecular form in such manner that the steam becomes, to all intents and purposes impregnated and surcharged with hydro-carbon in a nascent state so that it will immediately combine with the water gas,—when mixed with said gas in the upper part of the carbureter chamber *b*,—the steam enveloping the molecules of hydro-carbon and protecting them against carbonization before their chemical combination with the hydrogen.

The spiral course of the vaporized hydro-carbon and steam is made to traverse through the atomizer also imparts to the blast injected into the carbureter a gyratory movement which is most effective in quickly causing the thorough admixture and union of the several gases preparatory to their descent through the check work *b''*. This gyratory movement is enhanced by making the top or dome *b'*, of the mixing and fixing chamber *b*, of truncated concave conical form so as to guide and confine the blast axially around the center of the chamber and cause the steam saturated hydro-carbon vapor to be precipitated directly into the water gas in the upper portion of the chamber *b*, so that all the gases are thoroughly agitated and stirred together to facilitate and expedite chemical reaction.

In the construction of atomizer L, shown in the drawings *l*, is a vertical cylindrical chamber the bottom of which fits the truncated opening in the concave conical dome

b' , of the mixing and fixing chamber b , so that both of said chambers are in axial alignment, since the mixing and fixing chamber b , is also preferably vertical and of cylindrical shape.

The lower end of the tubular chamber l , is formed with a central conical valve seat l' , into which fits a needle or conical valve l^2 , on the end of the adjustable valve rod l^3 , so that said valve l^2 , may be regulated accurately and delicately in position with relation to its seat l' . Above the valve seat l' , is arranged spiral or auger shaped member s , which may be attached directly to the valve rod l^3 ,—the valve itself forming the end or apex of the auger-shaped member s , although this is not essential since the spiral partition may be otherwise disposed, the lower extremity of the rod terminating in the valve seat l' ,—the main and distinguishing feature of construction in this respect being a spiral passage leading to said conical valve seat, so that the blast of vaporized hydro carbon and steam will acquire and maintain a gyratory movement even after the passage through said valve seat l' . It is to be understood that the main convolutions of the spiral member s , fit the inner side walls of the cylindrical chamber l .

The liquid hydro-carbon and the steam under pressure may obviously be introduced directly into this tubular injector chamber l , if desired, but I prefer in most cases to introduce the hydro-carbon and steam through a lateral or auxiliary chamber l^4 , in which is another spiral member s' , creating a spiral passage through which the liquid hydro-carbon and steam under pressure must pass on the way to the injector tube l ,—the enforced contact with the convolutions of the spiral member s' , insuring the complete disintegration and atomizing of the hydro-carbon and the impregnation of the steam therewith prior to the entrance of the admixture into said injector tube l . t , represents a tube and t' , a valve for controlling the supply of steam to the atomizer L , and u a tube, and u' , a valve for controlling the supply of liquid hydro-carbon thereto.

In practice the preliminary heating of the parts is effected in substantially the same manner as heretofore. The supply of hydro-carbon and steam having been cut off, and the generating chamber having been charged with fuel and sealed, the cap g' , at the top of the superheater G is opened and air under pressure is admitted to the ash pit a^4 , through the valve e^2 , to effect combustion of the fuel in the cupola A . Air is also admitted through the valve e' , to the air conduit d , in the casing C , as well as through the valve e^5 , to the super heater G , to oxidize the products of combustion passing over from the fuel in the cupola A .

When the several parts have been raised

to the requisite degree of temperature and the fuel in the cupola rendered incandescent, the air supply is cut off and the cap g' , closed, when steam is admitted to and through the incandescent fuel by the valve f' , and pipe f , or equivalent means, the water gas generated by the decomposition of the steam passing through the fuel a^5 , where it is met by the gyratory blast of vaporized hydro-carbon and steam admitted to the mixing and fixing chamber b , by the opening of the valve l^2 , as hereinbefore set forth.

By forming the air conduit d , within the casing C , and between the generating chamber a and the mixing and fixing chamber b , I not only effect a saving in floor space, but I also heat the air before its admission into the chamber b , during the preliminary heating process thereby promoting the oxidation of the products of combustion entering through the flue a^5 , preventing the chilling of the checker work b^2 , and effecting economy by the utilization of otherwise waste heat. The including of the carbureter within the same casing and shell as the cupola is also of importance in that the excess of heat radiating from the generator chamber a , as heretofore constructed, is utilized largely in effecting and maintaining the temperature of the carbureter.

What I claim as my invention and desire to secure by Letters Patent is,

1. An improved gas apparatus having in combination a cupola and a carbureter and a single casing inclosing the two, said cupola having a gas-generating chamber and said carbureter having a mixing and fixing chamber in its upper end and in direct connection with the upper end of the gas-generating chamber, an atomizer casing connected to the upper portion of the mixing chamber having a regulable communication with said chamber, steam and oil pipes discharging into an opposite portion of the atomizer casing, and means obstructing that portion of the atomizer casing between the steam and oil inlets thereto and the regulable outlet therefrom and against which obstructing means the mixture of steam and oil impinges and is then conducted tortuously, to reduce the oil into molecular form and to enable steam to form a protecting envelop for the oil molecules to thereby prevent the carbonization of the oil before its mixture with the water-gas in the mixing chamber of the carbureter.

2. In gas making apparatus the combination with connected gas-generating and carbureting chambers, of a casing fitted to the upper portion of the carbureting chamber having a regulable outlet thereinto, deflecting means forming a tortuous passage within said casing in advance of said outlet, and steam and oil pipes delivering into said casing in advance of the deflecting means, said steam serving to deliver the oil into contact

with the deflecting means and thereby reduce and atomize the oil and said steam serving, also, as a carrier of the oil through the tortuous passage and enveloping the oil molecules to protect them from carbonization before they are delivered in a nascent state into the carbureter.

3. In gas making apparatus the combination with connected gas-generating and carbureting chambers, said carbureting chamber having a truncated cone-shaped upper end, of a casing fitted to the carbureting chamber and leading into the apex thereof, and having a regulable outlet thereinto, deflecting means forming a tortuous passage within said casing

in advance of said outlet, and steam and oil pipes delivering into said casing in advance of the deflecting means, said steam serving to deliver the oil into contact with the deflecting means and thereby reduce and atomize the oil and said steam serving, also, as a carrier of the oil through the tortuous passage and enveloping the oil molecules to protect them from carbonization before they are delivered in a nascent state into the carbureter.

ALEXANDER M. SUTHERLAND.

Witnesses:

D. W. GARDNER,
GEO. WM. MIATT.