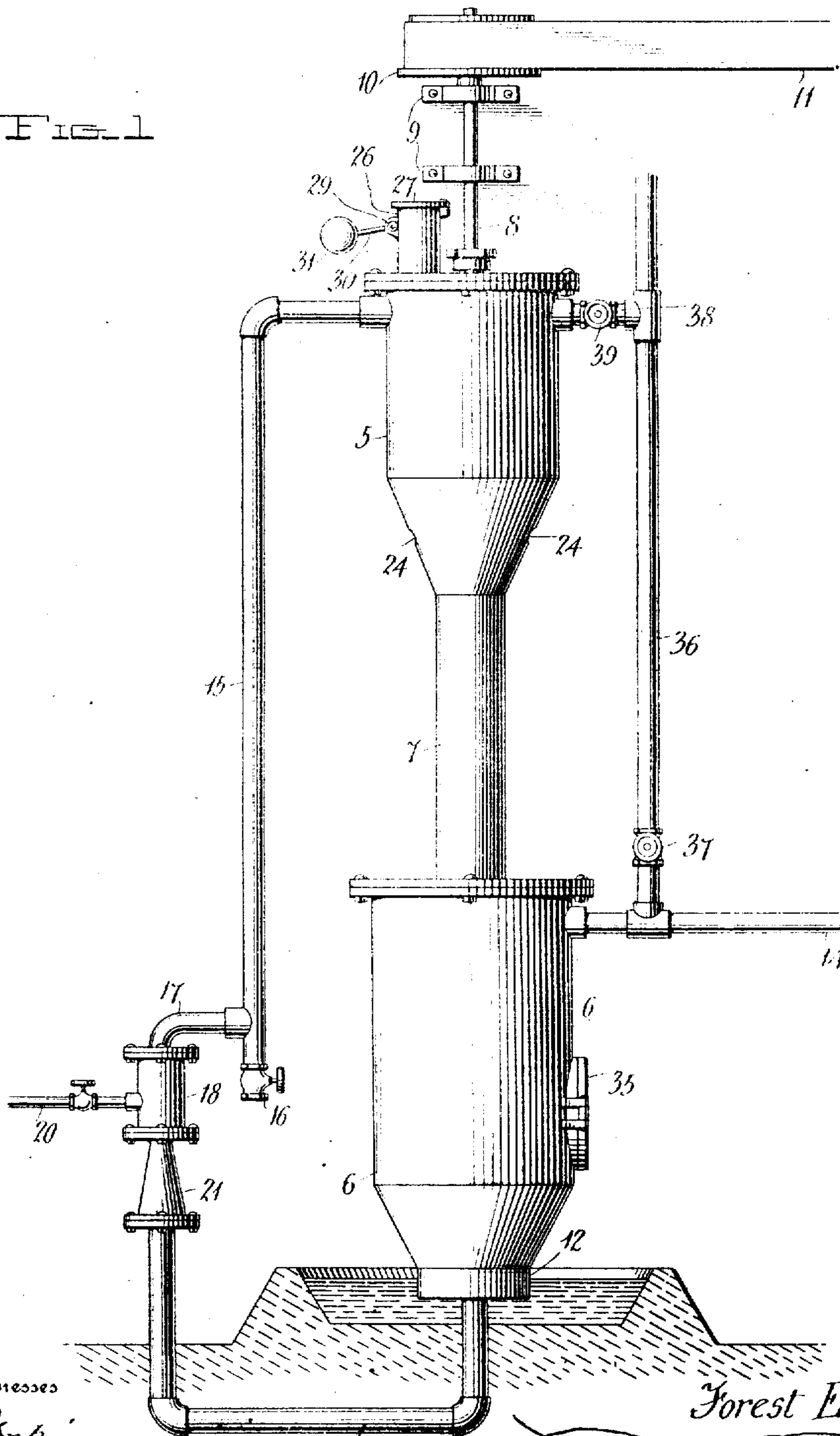


907,110.

F. E. FINK.
APPARATUS FOR PRODUCING GAS.
APPLICATION FILED DEC. 19, 1907.

Patented Dec. 15, 1908.
3 SHEETS—SHEET 1.

Fig. 1



Inventor

Forest E. Fink

Witnesses

H. B. MacNeil

Charles Chapman

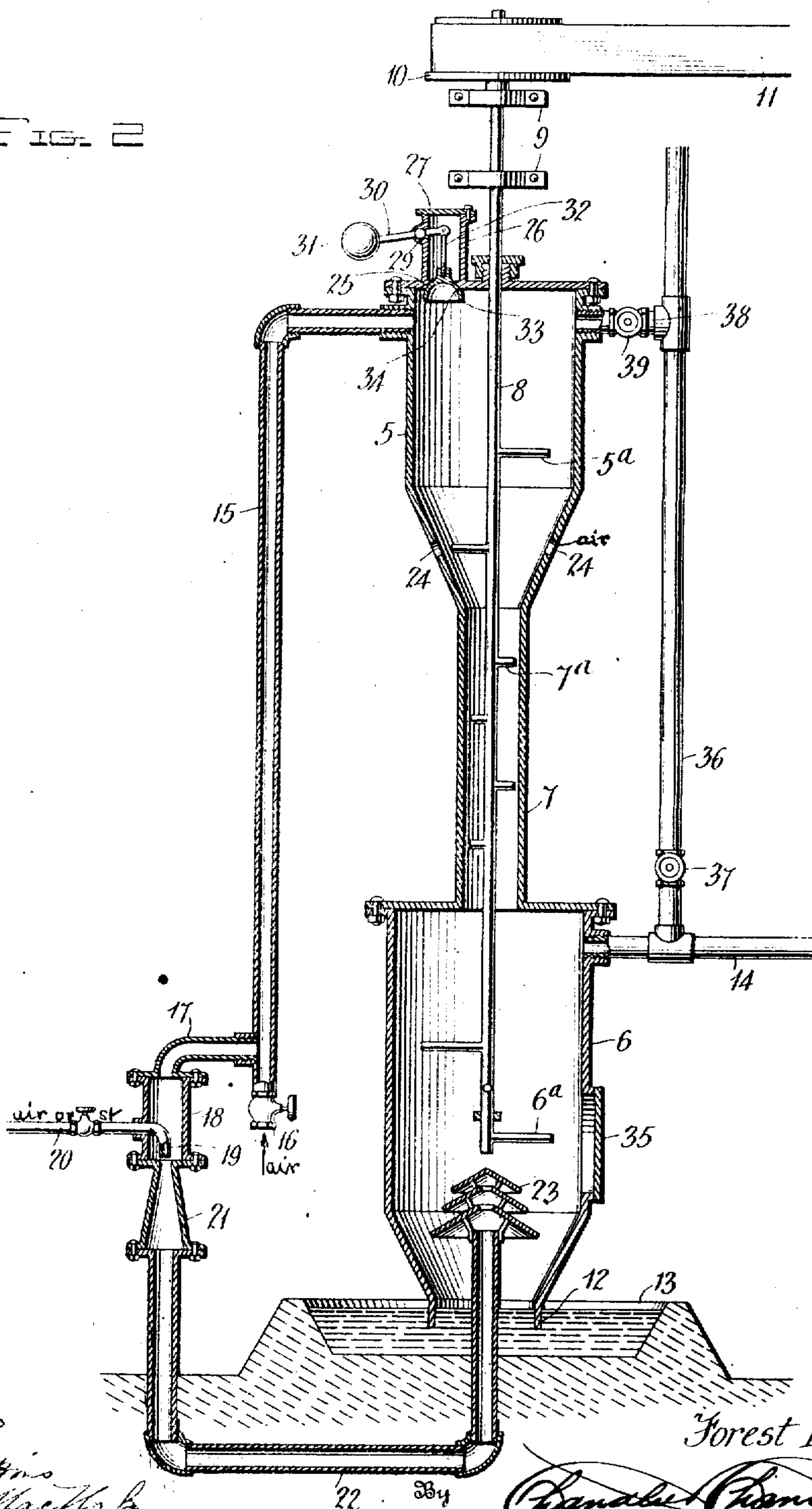
Attorneys

907,110.

F. E. FINK.
APPARATUS FOR PRODUCING GAS.
APPLICATION FILED DEC. 19, 1907.

Patented Dec. 15, 1908.
3 SHEETS—SHEET 2.

FIG. 2



Witnesses
J. L. Perkins
H. B. MacArthur

Inventor
Forest E. Fink
Charles C. Fink

Attorney

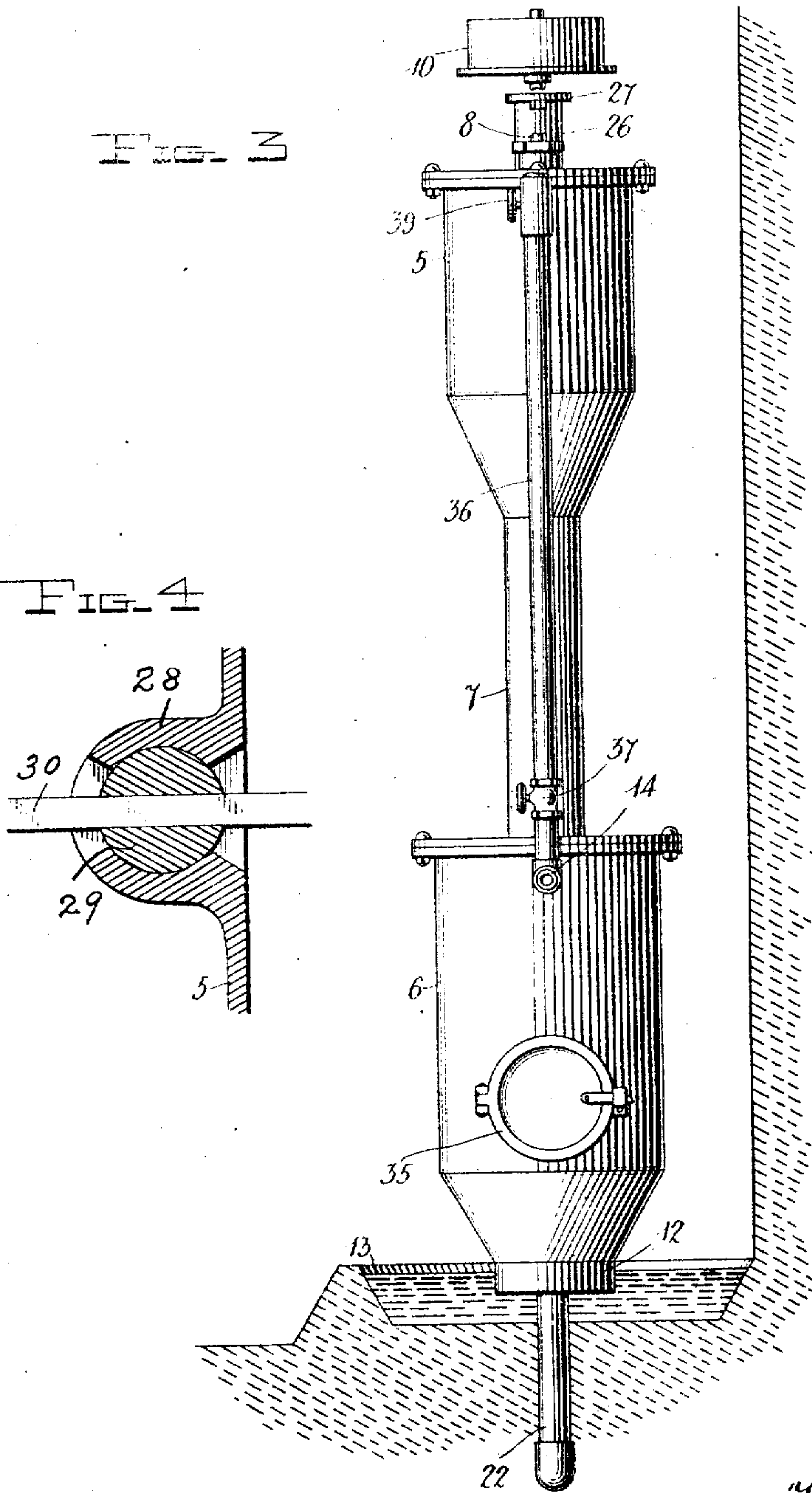
907,110.

F. E. FINK.
 APPARATUS FOR PRODUCING GAS.
 APPLICATION FILED DEC. 19, 1907.

Patented Dec. 15, 1908.
 3 SHEETS—SHEET 3.

FIG. 3

FIG. 4



Witnesses

J. L. Fink

John D. Fink

Inventor

Forest E. Fink

By

Charles H. Fink

Attorneys

UNITED STATES PATENT OFFICE.

FOREST E. FINK, OF CORTLAND, OHIO.

APPARATUS FOR PRODUCING GAS.

No. 907,110.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed December 19, 1907. Serial No. 407,237.

To all whom it may concern:

Be it known that I, FOREST E. FINK, a citizen of the United States, residing at Cortland, in the county of Trumbull, State of Ohio, have invented certain new and useful Improvements in Apparatus for Producing Gas; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in apparatuses for producing gas and it has more particular reference to a gas producer comprehending in its broad conception a coking chamber and a gas producing chamber in which incandescent coke is stored and from which the gas is exhausted either by suction or by pressure.

The invention is designed more particularly to produce gas from bituminous coal and its chief object is to produce a gas which shall be as far as possible, free from extraneous matter, such as tar, soot, lamp black, etc.

The invention seeks to provide an apparatus for producing a gas from bituminous coal which, as it leaves the producer, shall be as near ready as possible for service in connection with gas engines, the latter, as is well known, requiring a clean gas with a minimum percentage of impurities and one that is highly combustible.

The invention more particularly comprises the arrangement of the gas producing chamber below the coking chamber; means for causing the feed of fuel from the coking chamber to the producing chamber; means for generating a high temperature in said coking chamber, through the introduction of atmospheric air, hot air, or steam, or steam and air, into said coking chamber; for the purpose of thoroughly coking the green fuel before leaving the said coking chamber; means for thoroughly mixing air, or steam, or air and steam, with the green fuel in said coking chamber; means for preventing the caking of the green fuel in said coking chamber; means for exhausting volatile products from the coking chamber; means for creating an up draft of steam or air, or steam and air through the producing chamber; means for preventing the gas produced in said gas producing chamber from passing through the green or uncoked fuel; means for allowing a draft or

circulation of air in said coking chamber, and gas producing chamber, when said gas producing apparatus is not in operation, and means for exhausting gas from the producing chamber.

The invention resides in the several features above enumerated and in the novel construction, combination and arrangement of parts, to be hereinafter described and claimed in detail.

The details of the invention will appear in the course of the following description, in which reference is had to the accompanying drawings, forming a part of this specification, like characters of reference designating similar parts, throughout the several views, wherein:—

Figure 1 is a side elevation of the gas producer constructed in accordance with the present invention. Fig. 2 is a central longitudinal sectional view of such producer. Fig. 3 is a front elevation thereof showing the door or tap for moving the cinders from the gas producing chamber proper. Fig. 4 is a detailed sectional view illustrating the pivotal mounting of a valve lever comprehended in the invention.

In the accompanying drawings, the numeral 5 designates the coking chamber, the numeral 6 designates the gas producing chamber and the numeral 7 designates a narrow neck or channel between the coking chamber and the gas producing chamber. A vertical shaft 8 passes axially through the chamber 5 and the channel 7 and projects some distance into the chamber 6. The shaft 8 is journaled against axial movement in suitably constructed bearings 9 and at its upper end carries a belt wheel 10, which is driven from any suitable motor by a belt 11.

Within the chambers 5 and 6 and the channel 7, the shaft 8 is provided with agitating arms designated respectively 5^a, 6^a and 7^a, which project radially therefrom, and which terminate short of the sides of the chambers 5 and 6 and the channel 7, the arms 5^a and 6^a having the same proportion with relation to the chambers 5 and 6 that the arms 7^a have to the channel 7, and being of relatively greater length than said arm 7^a. The chamber 6 has a reduced end 12 which projects into the confines of a basin 13 and coacts with said basin to afford a seal, the basin 13 being partially filled with water to point above the mouth of the reduced end 12. Leading from the chamber

6 is a gas outlet pipe 14 from which the gas is exhausted by means of the pressure within the chamber 6 and likewise by means of a suitable exhaustor (not shown) connected to the pipe 14.

Leading from the upper end of the chamber 5 is a pipe 15 provided at its lower end with an air valve 16, and having connection above said valve with a laterally projecting pipe 17, the latter being in turn connected with a casing 18, into which is projected a nozzle 19, carried by a valve controlled pipe 20, which leads from any suitable source of steam or air supply, preferably the former. The casing 18 has a flaring mouth 21 which is connected to a U-shaped pipe 22, the latter passing through the basin 13 and axially into the chamber 6 and having its upper discharge end provided with a suitably constructed spreader 23.

For the purpose of admitting air into the chamber 5, to facilitate combustion, the latter is provided preferably adjacent to its inverted cone shaped lower portion with one or more suitable openings 24. The top plate of the chamber 5 is constructed with an opening 25 in registry with a cylindrical charging hopper 26, which is secured to said top plate and which is closed by a lid 27 pivoted for horizontal movement. The hopper 26 is constructed at one side thereof with a hollow projecting portion 28 having the upper and lower walls thereof concaved as shown in Fig. 4 of the drawings, and against which concaved walls there fits a rock shaft 29 through which is engaged a lever 30, one end of which projects into the hopper while the other end projects outwardly beyond the shaft 29. The opening from the hopper to this enlargement is formed to permit of a limited vertical movement of the inner end portion of the lever, while the outer face of the enlargement is correspondingly slotted to permit of like movement of the outer end portion of the lever. The lever 30 carries on its projecting outer end a weight 31 and at its inner end is pivoted to a depending rod 32 carrying at its lower end a conical bell valve 33 having a rounded engaging surface 34 which is designed to facilitate the centering of the valve 33 upon its seat afforded by the edge of the opening 25, the provision of the rounded surface 34 assuring of the constant contact of the valve at all points with its seat, even though the said valve should for any reason be seated somewhat off-center. The chamber 6 is provided with a door 35 from which the cinders may be removed. The pipe 14 is connected to a vertical draft pipe 36 having at its lower end a hand valve 37. The pipe 36 is connected by a branch pipe 38 with the chamber 5, a valve 39 being interposed in the pipe 38.

In use, the chamber 5 is charged with coal which is admitted from a suitable supply through the hopper 26. The charge of coal in the chamber 5 is fired and the shaft 8 is rotated, air or air and steam is admitted through the openings 24, causing a natural process of combustion, thus thoroughly coking the green fuel, before it enters the gas producing chamber, said openings 24, may be placed at any point or points in the coking zone, and as the green coal becomes incandescent, it is fed through the channel 7 into the chamber 6 in the form of incandescent coke. The radial arms 5^a, in the chamber 5, keep the green fuel in a loosened state, allowing the free access of air, or air and steam, to all parts of said fuel, also preventing the caking of the fuel, and allowing a free passage of the volatile products from said fuel before it enters the gas producing chamber, the radial arms 6^a, and 7^a, prevent the caking of the coke at any time within the channel or gas producing chamber. The channel 7, being constantly filled with coke, will evade the passage of gas from the gas producing chamber 6, as the gas will naturally follow the course of least resistance, and escape through the pipes provided for that purpose. When the chamber 6 has been partially filled with a bed of incandescent coke, an up draft of air or steam, or air and steam is admitted into the chamber 6 from the pipe 20, through the pipe 22. The steam or air thus admitted into the chamber 6 mingling with the incandescent coke stored therein, forms a combustible gas which is exhausted. The steam forced into the pipe 22 creates a suction in the pipe 15 by means of which volatile products containing suspended tar, soot and lamp black are drawn off from the chamber 5 and carried with the charge of steam or air or steam and air into the chamber 6. Ordinarily, the cinders and by-products are removed by shoveling beneath the reduced end 12 in the basin 13. When so desired, such cinders and by-products may be removed through the door 35. It will thus be seen that the coking process is carried out in a highly efficacious manner by the intensely heated products of combustion brought about by the introduction of an up draft of hot or cold air, or air and steam, into said chamber, through the openings 24, and being thoroughly mixed with the green fuel, by means of the radial arms projecting from shaft 8. It is preferred to connect the chambers 5 and 6 by the reduced channel 7 in order to prevent the free passage of gases between the chambers 5 and 6. When it is desired to let the apparatus stand over night without use, and to maintain the incandescence of the bed of coke in the chamber 6, the valves 37 and 38 are opened in order that a free draft may be created through the pipe 36, it being of course un-

derstood that the shaft 8 and the steam or air supply means may or may not be in operation.

It will be apparent that by coking the green fuel in the chamber 5 at a high temperature, a greater amount of tar, soot and lampblack is broken up and gasified before the passage of the volatile products through the incandescent bed of coke than is possible in those apparatuses ordinarily used, wherein the bed of green fuel is arranged beneath the bed of coke and is not coked by a natural process of combustion. Hence, it will be seen that the final gaseous product will contain a minimum amount of solid hydro-carbon products and that any possibility of contaminating the final product by suspended extraneous matter is prevented by the provision of means for attaining a sufficient degree of coking of the green fuel before it enters the gas producing chamber.

The invention is simple in its structural details, inexpensive to manufacture and practical and efficient in use.

A division of this application for the process of producing gas which involves the apparatus herein has been filed under date of August 4, 1908, Ser. No. 446,888.

What is claimed is:

1. A gas producing apparatus, consisting of a coking chamber, and a gas producing chamber, a neck or channel connecting said chambers, a vertical shaft with radial arms for agitating the products within said chambers and neck, a seal at the lowermost portion of said gas producing chamber, a pipe extending from said coking chamber and passing through said seal and extending into said gas producing chamber, a plurality of deflectors, secured to the end of said pipe, said deflectors being arranged whereby the gaseous fluids will be deflected consecutively from said deflectors into said gas producing chamber, a means for the generated products in said gas producing chamber to escape, as specified.

2. A gas producing apparatus, consisting of a coking chamber with inlets therein near its lower portion, and a gas producing chamber, a neck connecting said chambers, an agitator with radial arms, located within said neck and chambers, a seal enveloping the lowermost portion of said gas producing chamber, a pipe extending from said coking chamber and extending through said seal, into said gas producing chamber, deflectors secured to the free end of said pipe, within said gas producing chamber, apertures in said deflectors for allowing the gaseous fluids to enter each deflector consecutively, as specified.

3. A gas producing apparatus, consisting of coking and gas generating chambers, a neck connecting said chambers, of an outside pipe connecting the upper parts of said cok-

ing and gas producing chambers, valves located within said pipe for allowing or preventing or promoting the free circulation of air into and between said chambers,

4. An apparatus for producing gas, consisting of a coking chamber, and a gas producing chamber, a neck connecting said chambers, said coking chamber having a reduced lower portion with suitable openings therein, a centrally located shaft extending through said chambers, with radial arms of various lengths connected thereto, and located within said chambers and neck, means for permitting the circulation of air into said chambers, a suction or vacuum pipe extending from the coking chamber, on the outside, into a casing, a steam jet within said casing, disseminating tar and by-products from said coking chamber, into the gas generating chamber, as described.

5. An apparatus for producing gas, consisting of a coking chamber, and a gas producing chamber and a neck connecting the coking and gas producing chambers, means for the injection of air, or steam, into said coking chamber, means for mixing said air, or steam, with the fuel in said coking chamber, a suction or vacuum pipe extending from the coking chamber into a casing, a steam jet within said casing disseminating tar and by-products from said coking chamber into the gas generating chamber, and a gas outlet connected to said gas generating chamber, as shown and described.

6. An apparatus for producing gas, consisting of a coking chamber, and a gas producing chamber, an elongated neck, connecting said chambers, openings in said coking chamber for the admission of air, or steam, means for thoroughly coking the green fuel before entering said gas producing chamber, means for agitating the contents of said coking chamber, elongated neck, and gas producing chamber, means for driving the gases produced in said gas producing chamber, from said chamber, into outlets provided for that purpose.

7. An apparatus for producing gas, consisting of a coking chamber, and a gas producing chamber, and a neck connecting the coking and gas producing chambers, means for agitating the contents of said coking chamber, and said neck, and said gas producing chamber, a pipe connected to said coking chamber and extending to a casing having a steam jet or nozzle therein, in conjunction with a pipe connected with said gas producing chamber, and an outlet for the gas produced in said gas producing chamber, as shown and described.

8. A gas producing apparatus, consisting of a coking chamber, and a gas producing chamber, and a neck connecting the coking and gas producing chambers, means for conveying the volatile products produced in

said coking chamber, into the lower portion of said gas producing chamber, means for allowing free access and circulation of air into said coking chamber, and gas producing chamber, as shown and described.

9. An apparatus for producing gas consisting of a coking chamber, a gas producing chamber, a neck connecting the coking and gas producing chambers, said coking chamber having an inverted cone shaped bottom portion with suitable openings therein, said gas producing chamber having a reduced bottom portion inclosed in a water seal, of a pipe extending through said seal into said gas producing chamber, deflectors arranged on the end of said pipe, and means for forcing the volatile products from the coking chamber through said pipe into the gas producing chamber, as shown and described.

10. An apparatus for producing gas, consisting of a coking chamber, and a gas producing chamber, and a neck connecting the coking and gas producing chambers, a charging hopper, provided with a horizontally disposed lid, an inverted bell valve, seated against said charging hopper, held to its seat by a gravity weight, of a vertical shaft,

carrying radial arms of various lengths, extending into the coking chamber, through the neck, and into the gas producing chamber, a seal enveloping the lowermost portion of said gas producing chamber, an outside pipe extending from the coking chamber, into a casing, a steam jet, or nozzle, within said casing, the bottom of said casing integral with a flared mouth receptacle, a pipe extending therefrom and passing through said seal, into said gas producing chamber, which is provided with deflectors, said pipe and deflectors terminating within and near the bottom of said gas producing chamber, a regulating device, consisting of a pipe entering both chambers from the outside, and having hand valves therein, adjacent to said chambers, whereby a draft of air can be admitted into said chambers, as shown and described.

In testimony whereof, I affix my signature, in presence of two witnesses.

FOREST E. FINK.

Witnesses:

E. O. DILLEY,
JENNIE EBERT.