

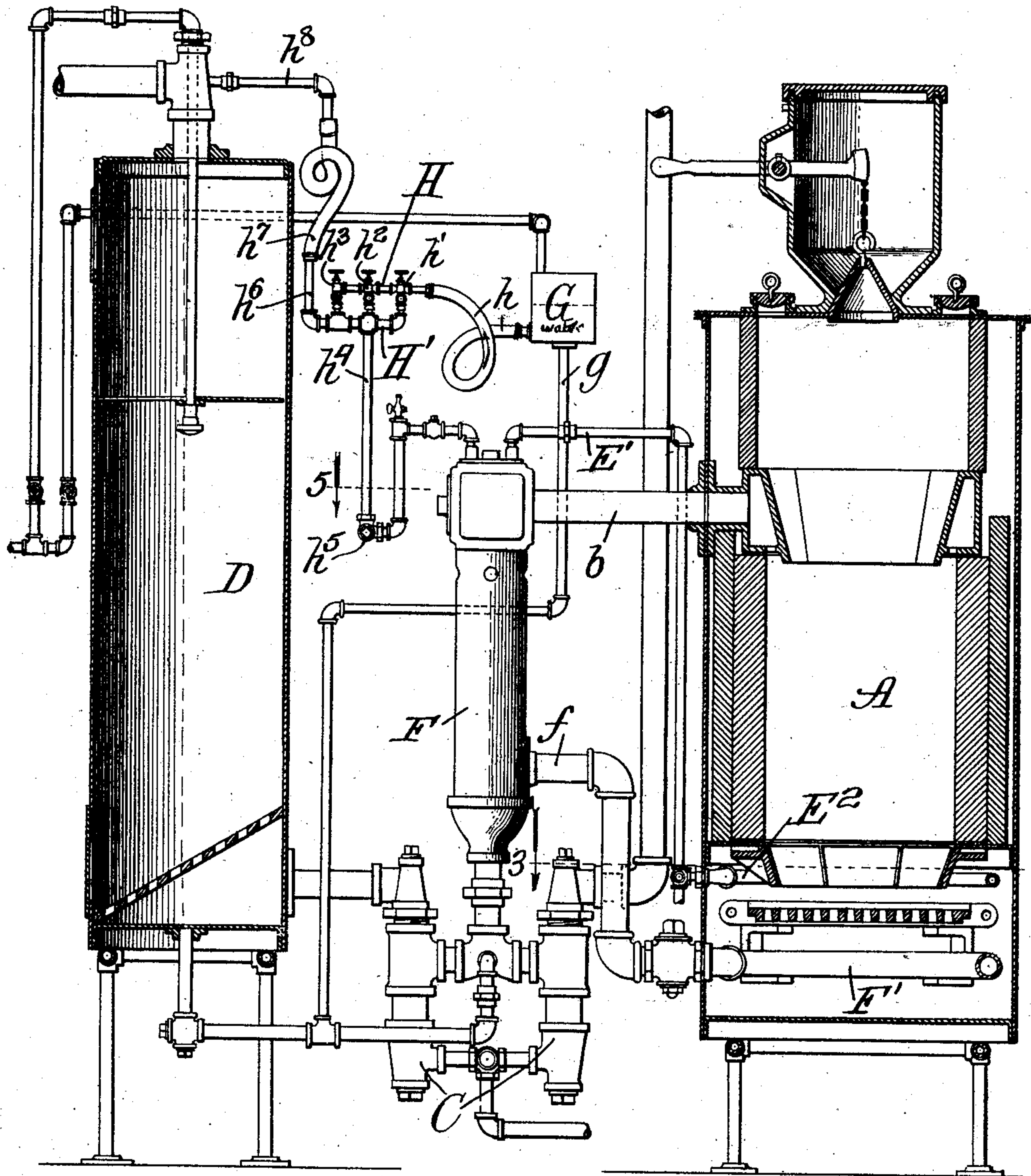
C. A. HARVEY.
SATURATING MEANS FOR GAS PRODUCER SYSTEMS.
APPLICATION FILED OCT. 12, 1908.

994,390.

Patented June 6, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Edw. L. Gaylord,
Chas. H. Buell.

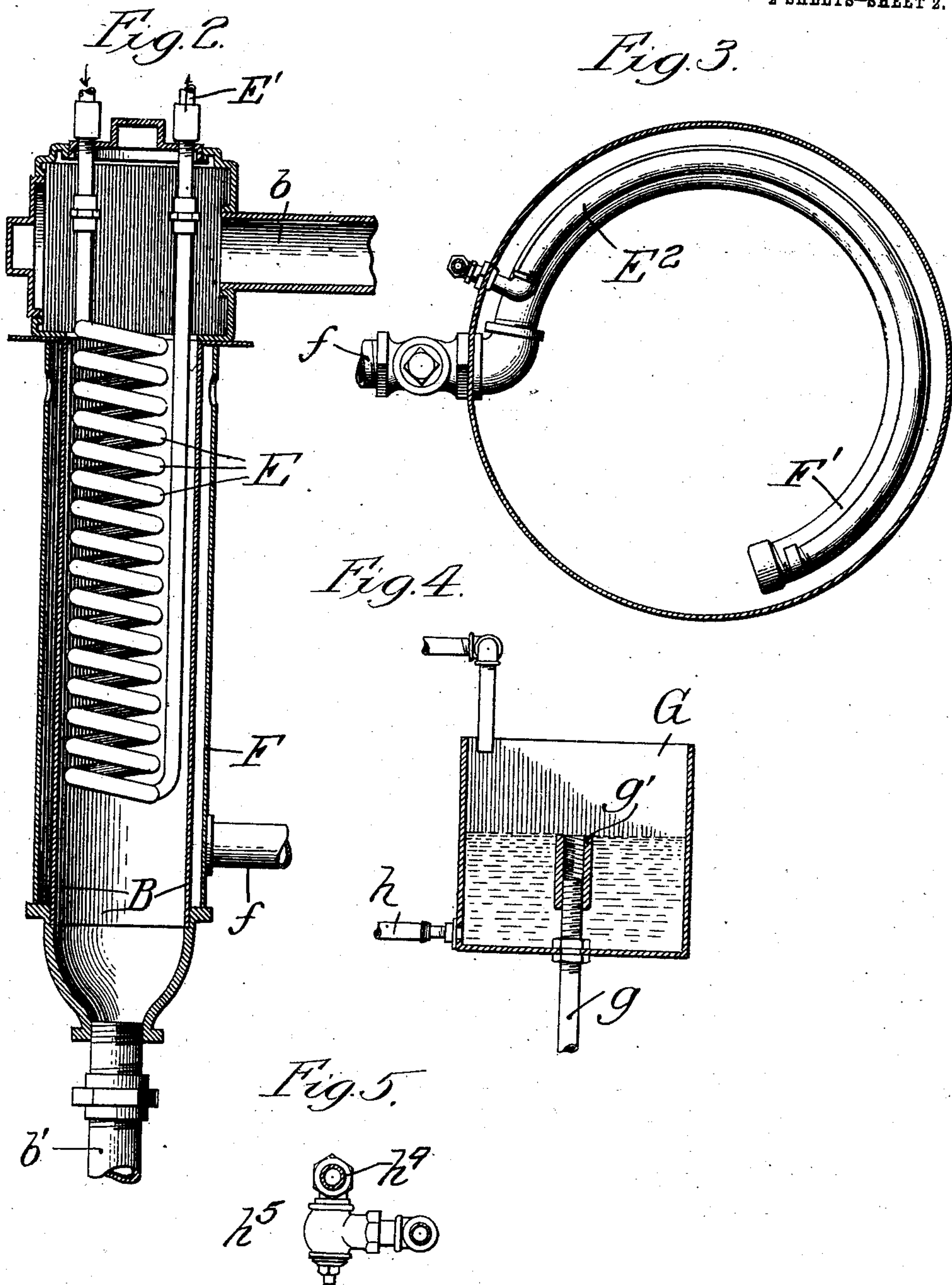
Inventor:
Charles A. Harvey,
By Deyenforth, Lee, Crittton & Wiles,
Attys.

C. A. HARVEY.
SATURATING MEANS FOR GAS PRODUCER SYSTEMS.
APPLICATION FILED OCT. 12, 1908.

994,390.

Patented June 6, 1911.

2 SHEETS-SHEET 2.



Witnesses:
Edw. Gaylord.
Chas. H. Buell.

Inventor:
Charles A. Harvey,
By Dyrenforth, Lee, Britton & Miles,
Attys.

UNITED STATES PATENT OFFICE.

CHARLES A. HARVEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO PRODUCER GAS UTILITIES COMPANY, A CORPORATION OF ILLINOIS.

SATURATING MEANS FOR GAS-PRODUCER SYSTEMS.

994,390.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed October 12, 1908. Serial No. 457,307.

To all whom it may concern:

Be it known that I, CHARLES A. HARVEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Saturating Means for Gas-Producer Systems, of which the following is a specification.

My invention relates to certain new and useful improvements in saturating means for gas producer systems, and is fully described and explained in the specification and shown in the accompanying drawing in which—

Figure 1 is an elevation showing my improved apparatus in position for use, the same being shown in its usual relation to a producer, the scrubber being shown to one side and the producer proper to the other, both of such parts being shown in central longitudinal section; Fig. 2 is a longitudinal section through my improved saturator; Fig. 3 is a horizontal section in the line 3 of Fig. 1; Fig. 4 is a vertical section through the water supply tank, showing the adjusting means therefor, and Fig. 5 is a horizontal section in the line 5 of Fig. 1, looking downward.

Referring to the drawings: A is the producer proper which may be, as far as its general features are concerned, of many desired types.

Referring to Fig. 2, B is the central tube or main tube of the saturating-device, the same having communication in the usual manner at its upper end through a pipe *b* with the exhaust-conduit of the producer proper, and being connected at its lower end by a pipe *b*¹ with a three-way valve C by which the hot products passing therefrom can be deflected either to the scrubber or the night-stack. This valve is only shown in the drawings in diagrammatic form. Usual connections are provided between the valve C and the scrubber and night-stack in an obvious manner.

D indicates the scrubber of the apparatus, which may be of any desired construction as far as the present invention is concerned.

The connections so far described are obviously such that if suction be applied to the scrubber in the usual manner, at a time when the valve C is set to discharge gas into the scrubber, the hot gas will be drawn from the producer proper, down through the central or main tube B of the saturator through the valve C into the lower end of the scrubber and thence up through the scrubber and out of the top thereof after contact with the water therein in the usual manner.

Within the central or main tube B of the saturating-device is a coil E of piping in which the vaporization of the water, to form the necessary aqueous-vapor, supplied to the fuel, is generated. Water is supplied to the upper end of this coil E in regulated quantities by means which will presently be described in detail and flows downward through the length of the coil, where it is vaporized, and passes out of the pipe E¹ which conveys the vapor through a curved pipe E² located within the producer proper and just above the grate thereof and around the normal fire-zone by which means the vapor generated in the coil E will be led around the hottest portion of the fuel-mass in the producer proper thereby being intensely super-heated before being discharged. It is found in practice that this super-heated condition of the water-vapor assists materially in the proper operation of the producer and in the generation thereby of gas of the desired quality. The main tube B of the saturating device is surrounded by a shell or jacket F perforated at its upper end and having communication near its lower end through a pipe *f* with a turn of pipe F¹ located just below the pipe E². The air which is supplied to the fuel-mass in the producer proper enters through the perforations in the upper portion of the jacket F, passes downward through said jacket and is highly heated by contact with the main tube B through which the hot products of the producer are constantly passing, thence is led to the pipe F¹ and passes therethrough in close proximity to the fuel-mass within the producer receiving therefrom a further

amount of heat so that it is heated to a very high temperature at the moment of its discharge into the producer proper.

From the above description of the construction thus far set forth, the general operation of the saturating mechanism and producer will be readily understood. With any given fuel demand thrown upon the producer and a given amount of water being supplied to the coil E, a certain fixed amount of super-heated steam will be introduced into the lower portion of the producer. This amount will in practice be so regulated by regulating the amount of water supplied, that the steam introduced is considerably less in volume than the demand made by the producer for steam and air. As a result the remaining constituents will be supplied in the form of air drawn in by the producer through the jacket F and pipe F¹. Thus by varying the amount of water supplied to the coil E, the proportions of the water-vapor and heated air supplied to the fuel-mass can be varied as desired, and the composition of the gas given off by the producer can be controlled. Furthermore, by providing means whereby the quantity of water supplied to the pipe E will vary with the suction exerted upon the producer by the gas using device, whether it be an exhauster, an engine, or other device, the proportions of the steam and air supplied can be maintained at a constant ratio at all times and the composition of the gas given off by the producer can thus be maintained constant during long continued periods of operation of varying demand.

The water to be utilized is, in the first instance, discharged from a suitable water-pipe into a tank G provided with an overflow pipe *g*, on the upper end of which is an adjustable collar *g*¹, by moving which the level of the water in the tank G can be varied. By this means it is obvious that a constant water level will be maintained in the tank, the water level being capable of adjustment if desired by moving the collar *g*¹. From the constant level tank, the water is led through a flexible pipe *h* to a header H upon which are mounted a plurality of valved passages *h*¹, *h*², *h*³, each provided with a sight-glass whereby the amount of flow can be readily observed, the valves therein discharging the water passing through them into a header H¹ whence it flows downward through a pipe *h*⁴ pivotally secured to a fitting *h*⁵ which communicates with the upper end of the coil E. Leading from one end of the header H¹ is a pipe *h*⁶ connected by means of a flexible coupling *h*⁷ to a pipe *h*⁸ which in turn leads to the gas exhauster, engine or other device mentioned above. By oscillating the pipe *h*⁴ about its

pivot, the header H can be given any desired inclination to the horizontal, so that the valves *h*¹, *h*², *h*³ will be arranged successively one above the other. The water-level in the tank G can then be varied so as to bring the water-level at approximately just below the height of the lowest of the series of valves. It will thus be evident that when so adjusted with no suction applied to the system, there will be no flow of water, and the entire structure will remain quiescent. The moment any suction takes place upon the producer, it will be transmitted through the pipe *h*⁸ to the header H¹ thereby exerting suction through the valves *h*¹, *h*², *h*³ upon the water in the flexible pipe *h* causing said water to rise along the incline of the header and to flow out of one or more of the valves *h*¹, *h*², *h*³, the number of valves through which the water flows being dependent upon the amount of suction exerted and upon the inclination of the header. The construction can obviously be so adjusted that a very slight suction will cause water to flow from all the valves simultaneously, but it is preferably arranged so that with a slight amount of suction the water will flow from one valve only and will issue from another valve on an increased suction and so on, the number of valves on the header and the inclination of the header being adjusted so that the water supplied will rise in volume with the increase and fuel demands thrown upon the producer. As soon as any water is supplied to the header H it will pass down the pipe *h*⁴ ultimately filling said pipe to the elbow thereof, and will eventually reach the coil E where it will be at once vaporized and pass downward, entering the producer as above set forth. The flow of water can be varied to any desired extent by adjusting the angle of the header H to the horizontal and varying the amount of opening in the valves *h*¹, *h*², *h*³ and by proper adjustment thereof any given amount of steam can be furnished to the producer and the parts can be so arranged that as the suction increases, the proportion of water furnished will remain constant so that an absolutely uniform gas is produced.

I realize that considerable variation is possible in the details of construction of my improved device, without departing from the spirit of my invention, and I do not intend therefore to limit myself to the specific form herein shown and described.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a producer-system, a producer proper, a vaporizer connected therewith, a vaporizer inlet pipe, a constant level water-supply, a plurality of passages through which water may be discharged from the

constant level-water supply to said vaporizer inlet pipe and means for varying the relative height of said passages.

2. In a producer-system, a producer proper, a vaporizer connected therewith, a constant level-water supply, a pivotally mounted pipe connected therewith and having a plurality of passages whose level can

be relatively varied by moving said pipe on its pivot and a vaporizer inlet pipe adapted to take the discharge from said passages and conduct the same to the vaporizer.

CHARLES A. HARVEY.

In presence of—

RALPH SCHAEFER,
CHAS. E. GAYLORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
