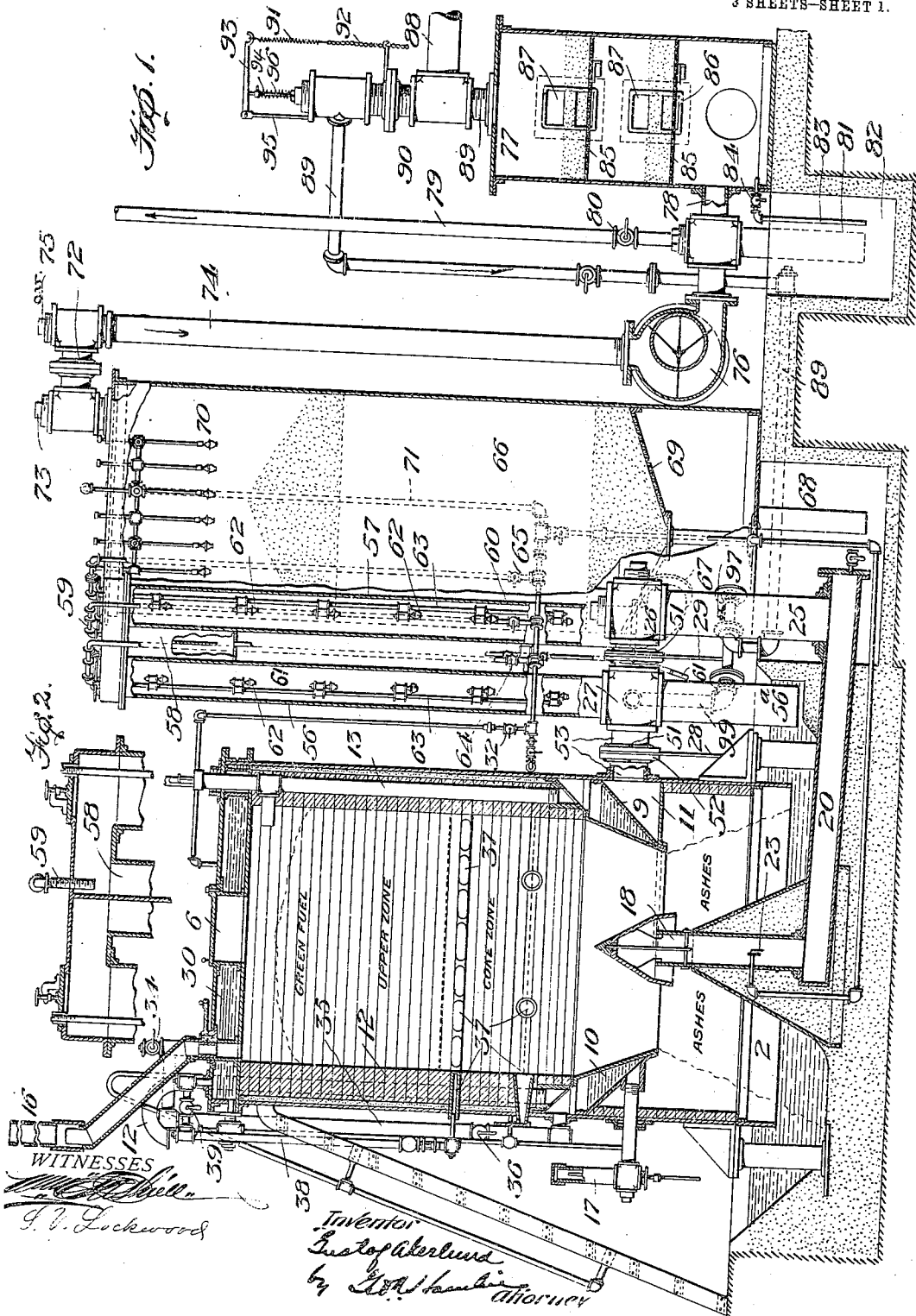


1,060,807.

G. AKERLUND.
GAS PRODUCER SYSTEM.
APPLICATION FILED FEB. 2, 1912.

Patented May 6, 1913.

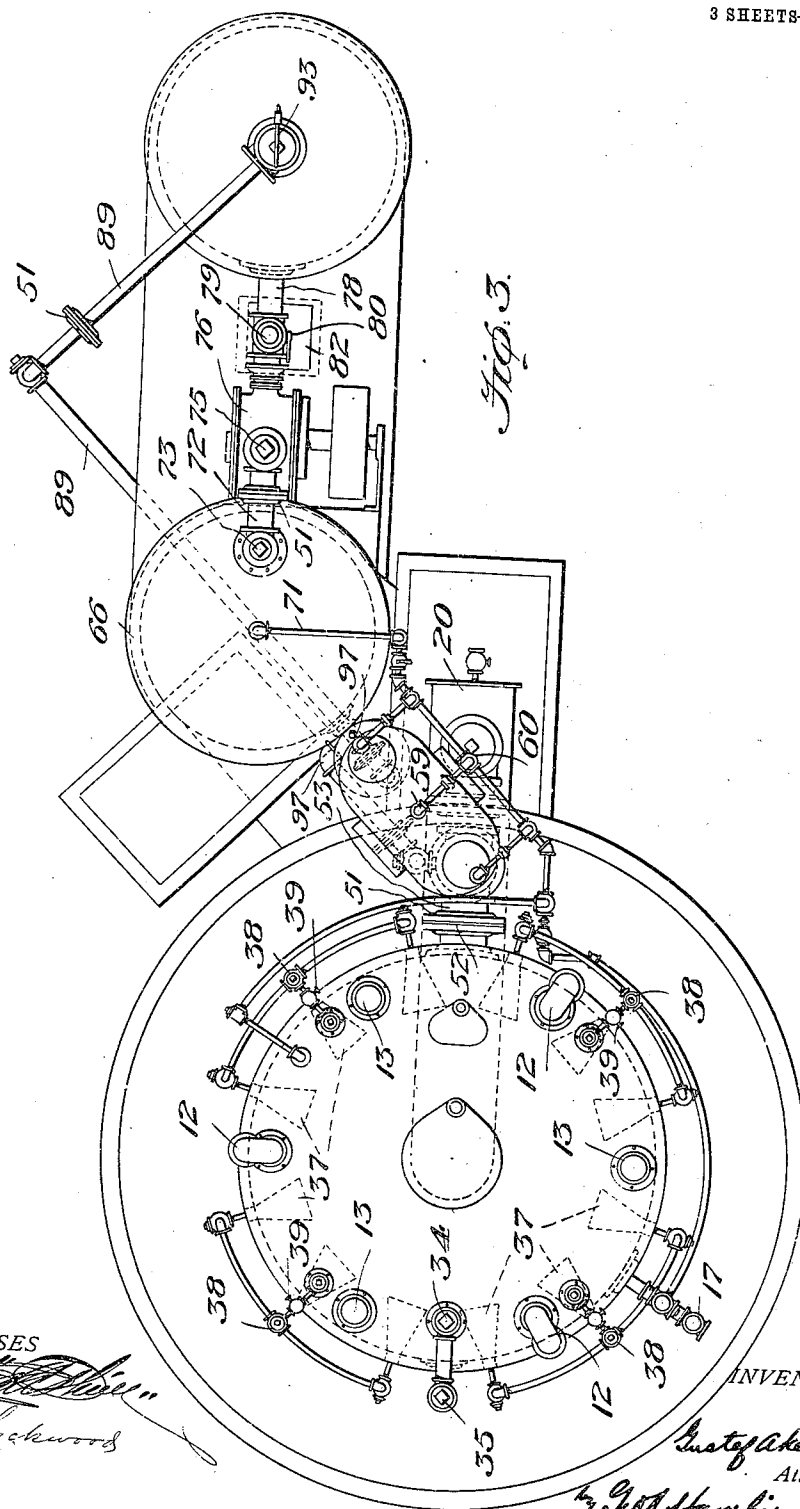
3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.



WITNESSES
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INVENTOR
Gustaf Akerlund
Attorney
[Signature]

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3 SHEETS-SHEET 3.

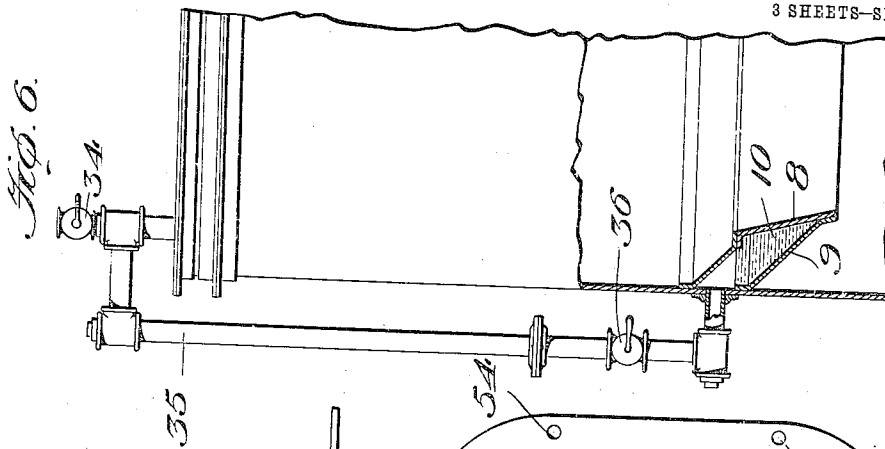


Fig. 7.



Fig. 8.

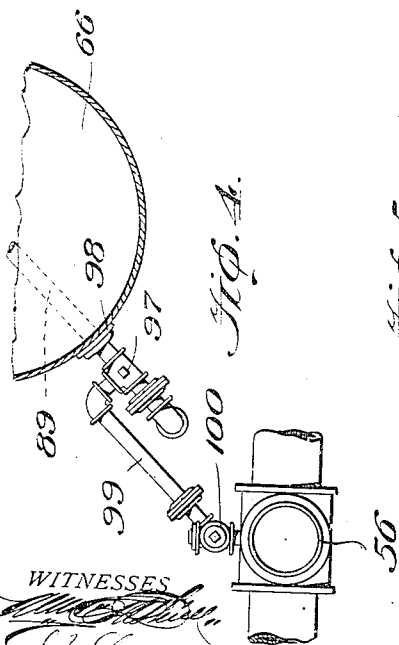
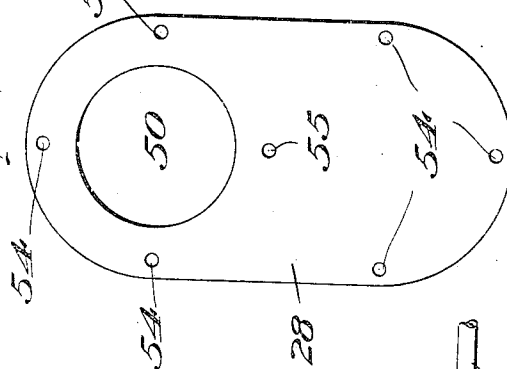
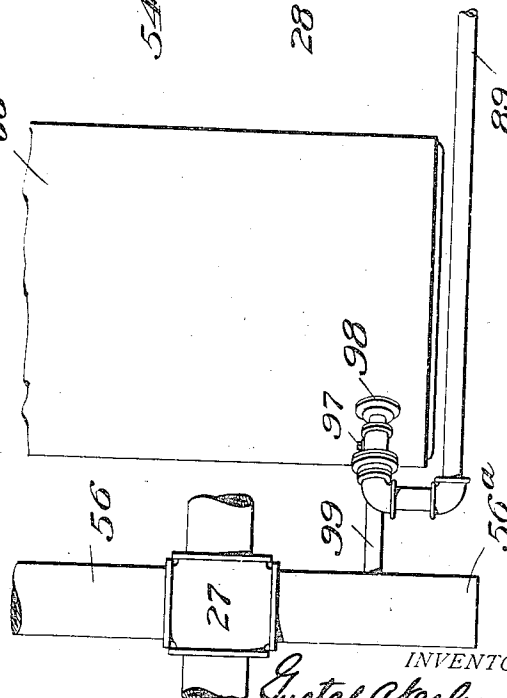


Fig. 5.



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UNITED STATES PATENT OFFICE.

GUSTAF AKERLUND, OF ATLANTA, GEORGIA, ASSIGNOR TO STANDARD GAS POWER COMPANY, OF ATLANTA, GEORGIA, A CORPORATION OF GEORGIA.

GAS-PRODUCER SYSTEM.

1,060,807.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed February 2, 1912. Serial No. 675,001.

To all whom it may concern:

Be it known that I, GUSTAF AKERLUND, a subject of the King of Sweden, residing at Atlanta, county of Fulton, and State of Georgia, have invented certain new and useful Improvements in Gas-Producer Systems, of which the following is a specification.

This invention relates to gas producer systems.

In my Patent No. 992,840 dated May 23, 1911, I have set forth and claimed a gas producer system wherein there is employed an exhaustor and means by which the draft may be reversed, without stopping or reversing the exhaustor, for the purpose of admitting fresh air to the generator and blowing out the waste gas through the stack.

The present invention has for its objects, first, the provision, in a gas producer system, of means whereby the gas may be re-passed through certain parts of the system and thereby re-cleaned; further, to provide for the automatic re-passing and re-cleaning of any surplus gas, above that needed for consumption at the delivery end of the system, so that the surplus gas is not only re-cleaned but a reduction of the vacuum at the generator outlet is accomplished and thus the fuel consumption is minimized.

While in my Patent No. 992,840, I have set forth how the draft may be reversed, the present invention has for a still further object the provision of means whereby the same piping which I have heretofore proposed to employ for the reversal of the draft through the generator, is utilized for conveying the surplus gas, not needed for consumption at the delivery end of the system, to parts of the system whereby such gas will be re-cleaned and more thoroughly purified for subsequent use at the delivery end of the system.

Another object of the present invention is to interpose the exhaustor between the scrubber and purifier so that while suction is exerted to draw the gas from the generator through the cooler and scrubber, the cooled and scrubbed gas is forced through the purifier; and, in that connection, the invention seeks, further, to combine the expansion tank of my former patent with the purifier, thereby simplifying the system and reducing the cost of installation thereof.

Another object of the invention is to provide in the same gas producer system, means for the reversal of the draft and also the re-passing and re-cleaning of the gas, as may be found necessary or desired and to regulate such re-cleaning of the gas automatically.

The present gas producer system is not limited to use in connection with any particular gas generator, although more particularly designed for use with a down draft suction generator, and in another application for a gas generator executed of even date herewith, I have shown a down draft suction generator of new construction with which the present gas producer system is well adapted for use in the economic production of high grade gas, and in the present application I have shown and described so much of that particular generator as is necessary to a full understanding of how any suction down draft generator may be used in the present system.

In carrying out the various features of the present invention, modifications of structure may be resorted to without departing from the mode of operation and the constructions set forth hereinafter and shown in the accompanying drawings are to be considered as illustrative, rather than restrictive, of the invention.

In the accompanying drawings: Figure 1 is a vertical section of the complete system; Fig. 2, a sectional detail of the upper part of the cooler; Fig. 3, a plan of the complete system; Fig. 4, a detail plan of the by-pass and re-cleaning pipe and controlling valves; Fig. 5, a side elevation thereof; Fig. 6, a detail side elevation showing the vapor transfer pipe; and Figs. 7 and 8, details of a gas valve.

The generator used in connection with the present gas producer system may be of any preferred suction down draft type; the one illustrated, however, forms the subject of another application executed by me of even date herewith. This generator has a water seal 2, a filling opening 6, a lower vaporizer 10, one or more inlet pipes 12 leading to the vaporizer 10, a mixture in-take 13 leading from the vaporizer 10, an upper vaporizer 30, a stack 16, a central gas off-take 18 communicating with a gas duct and drain 20 which in turn communicates with a leg or

pipe 25, a coupling 26 connected to the leg 25 and to a coupling and outlet 27, and a side gas off-take 11 communicating with the coupling 27. Valves 28 and 29 control communication between gas off-take 11 and the coupling and outlet 27, on the one hand, and communication between the leg 25 and the coupling 27, on the other hand. These valves will be described presently.

In the generator set forth, a pipe 35 having a valve 36 affords means for conveying surplus vapor from the upper vaporizer 30 to the lower vaporizer 10 and the valve 34 provides for the admission of air to the upper vaporizer. Twyers 37 are fed by pipes 38 leading from the upper vaporizer and controlled by valves 39 whereby the air and vapor from the upper vaporizer may be used as a secondary supply injected into the fuel of the fire below the upper zone and substantially at the top of the coke zone thereof.

The valves 28 and 29 are of the form shown in Figs. 7 and 8, each being flat and provided with an opening 50 at one side of the center of the major axis thereof. Bolts 51 passing through the collars 52 which are connected by screw threads to the pipes 53, also pass through the holes 54 on the valves. The center hole 55 and the bolt passing therethrough constitute a pivotal connection for the valve. When the valve is to be closed, all of the bolts except the pivot bolt are removed, the collars 52 are unscrewed and the valve is reversed to bring the blank part thereof uppermost. The collars are then tightened and the bolts re-inserted. When the valve is to be opened, the part having the aperture 50 is brought in line with the pipe sections 53 and the valve is then secured by the bolts and the collars. This valve is a very simple, inexpensive, and tight construction and inasmuch as the arrangement of the valves 28 and 29 is changed only at infrequent intervals, the valve is well adapted for this particular use.

The cooler has upright tubular compartments 56 and 57, the compartment 56 being connected to the gas outlet and coupling 27, the lower end 56^a of the said compartment being water sealed in the pit 2. The two compartments 56 and 57 are connected by a cooler water trap valve 58 which may be filled by pipe 59 controlled by valve 60 and receiving its supply from any suitable source. A drain 61 having a suitable valve affords means for draining the trap 58. Normally this trap 58 is empty and open for the passage of the gas, but when the producer is dormant, the trap is filled with water to cut the generator off from the balance of the system, thus preventing back flow of the gas contained in the remaining part of the system and preventing its loss. Within the compartments 56 and 57 are water sprays 62 connected to pipes 63 which

are controlled by the respective valves 64 and 65.

The scrubber 66 is in communication with the lower end of the compartment 57 at 67. The lower end of the scrubber is sealed in a water pit and overflow 68. The gas entering the lower part of the scrubber passes through the screen 69 which supports the scrubbing material and passes up through said material. In the upper part of the scrubber are a number of water jets or sprays 70 which are fed by a pipe 71 provided with any suitable controlling valve. The impurities washed out of the gas by the scrubber are drawn down into the pit 68. Leading from the top of the scrubber is a pipe 72 having a valve 73 whereby the scrubber may be cut off from the pipe 74 with which the pipe 72 communicates. The pipe 74 is provided with a valve 75 which may be opened to admit air to the exhauster and blower 76 when the draft is to be reversed as will appear hereinafter. In that event, the valve 73 is closed. The exhauster 76 may be of any preferred type.

The combined purifier and expansion tank 77 receives the gas from the exhauster 76 through a pipe 78 which is preferably provided with a waste gas pipe 79 having valve 80 for the discharge of the waste gas when this is desirable or necessary. Extending downwardly from the pipe 78 is a water seal pipe 81 opening into the pit 82 and the combined purifier and expansion tank 77 has a drain 83 provided with a suitable valve 84 entering the pit and seal by the water therein.

The purifier is provided with a plurality of shelves or trays 85 which carry suitable purifying material. Located adjacent each tray are a clean out hole 86 and a feed hole 87 so that while the purifying material of a given tray is being cleaned out or removed, fresh material may be introduced and much time saved in this operation. The purifier is of such size and arrangement that it not only serves as a purifying tank but also as a gas storage tank. The exhauster 76 draws the gas by suction through the cooler and scrubs and forces it by pressure into the purifier so that its free passage through the purifying material is insured. Leading from the purifier and expansion tank is a pipe 88 which conveys the gas to the point where it is to be used. This pipe may be provided with a valve, or, the valve may be located at the engine or other point of consumption so that when reversing the draft, as will presently appear, communication through the pipe 88 may be cut off.

Automatic re-cleaning of the gas.—At some suitable point between the exhauster 76 and the delivery pipe 78 or the pipe 88 there is connected a reverse and by-pass pipe 89. A convenient connection may be made

between this pipe and the expansion and purifier tank 77 and in that event the pipe may be joined to pipe 88 or to the outlet from the tank 77. A regulating valve 90 is normally kept seated at a suitable point in pipe 89 by a spring 91 whose tension may be regulated by a suitable adjustable connection such as a chain 92, the spring being connected to a lever 93 which bears on the upper end of the valve stem 94, the lever being secured to a standard 95. Surrounding the valve stem and bearing against a collar thereon is a cushioning spring 96 which cushions the seating of the valve so that the action of the spring 91 will not be too abrupt in seating said valve 90. This valve mechanism is so set or adjusted that the valve 90 will normally remain closed and the gas will be delivered into the pipe 88, but if a greater volume of gas is being delivered to the tank and purifier 77 than can be consumed by the engine or other device to which the gas is fed by pipe 88, the valve 90 unseats and allows the surplus gas to pass into pipe 89 until normal conditions prevail, whereupon the valve automatically re-seats itself. The pipe 89 leads to a three-way valve 97 and to the scrubber at 98 so that if the valve 97 is positioned to open communication between the scrubber and the pipe 89, which is the normal position of the valve, any surplus gas allowed to pass into pipe 89 by the opening of the valve 90, reenters the scrubber and is scrubbed a second time and also again purified. This by-passing and re-cleaning of the surplus gas is effected automatically, but I consider my invention, in this respect, to consist broadly in by-passing and re-cleaning the gas whether the control is discretionary or automatic and I do not limit myself to the automatic control. This by-passing and re-cleaning of the gas, insures economy of operation as the by-passed gas unites with the gas coming from the generator, and the vacuum exerted on the gas off-take of the generator, whether the off-take 11 or the off-take 18 be used, is reduced, thereby lessening the draft on the fuel in the generator and economizing in the use of such fuel.

Communicating with the casing of the three-way valve 97 is an up draft pipe 99 which connects with the outlet 27 and is provided with a valve 100 that is normally closed.

Normally the valve 97 is so positioned that communication between pipes 89 and 99 is closed and pipe 89 is in communication with the scrubber 66. When in this condition the surplus gas is by-passed to the scrubber and re-cleaned as before described. When it is desired to reverse the draft and blow the gases out through the stack 16, the valve 97 is adjusted to close communication between pipe 89 and the scrubber 66 and to

open communication between pipes 89 and 99. The valve 100 is also opened. If the valve controlling pipe 88, which is located at the engine where the pipe 88 enters it, be closed, and the valve 73 be closed and valve 75 be opened, there need be no reversal or stoppage of the exhauster 76, and fresh air will be drawn down through the pipe 74, forced through the purifier and expansion tank 77 and through the valve 90 which will open on account of the pressure, thus admitting fresh air into pipe 89 and this fresh air is blown through pipes 89, 99 and into the outlet and coupling 27. It will be understood that the valve 28 is open or the valve 29 is open so that the up draft may be blown into the generator to force the gases upwardly therefrom and out of the stack 16.

The gas taken out through either off-take 11 or 18, as may be preferred, passes into the leg or compartment 56 of the gas cooler where it meets the water sprays which cool it and release the impurities therefrom which drain continuously and directly into the water-seal pit 2. The gas then flows through the water-valve 58 which is empty and, passing underneath the partition therein, enters and passes down the remaining leg 57 of the cooler, being further sprinkled, cooled and relieved of its impurities, the latter draining down into the water-seal 68. The gas now rises through the scrubber 66 and finally passes into pipe 74, the draft of the exhauster 76 on the system causing the gas to be drawn to said exhauster from which it is forced into the tank 77 and thence into the pipe 88 to be delivered to the point of consumption. The regulating valve 90 is constantly subject to the gas pressure in the tank 77 and opens or closes, but usually maintains a more or less balanced condition, according to the consumption of the gas. Any surplus gas above that needed for consumption is by-passed into the pipe 89 and again enters the scrubber as previously explained, or, the draft may be reversed without stopping or reversing the exhauster 76 to blow the air through the pipe 89 back into the generator.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a gas producer system, the combination with a gas cleaner, of means for reintroducing or by-passing the gas after cleaning back into the cleaner, and a valve subject to and adapted to be opened by the pressure of the cleaned gas to automatically regulate or control the by-passing of the cleaned gas to the gas cleaner.

2. In a gas producer system, the combination with a generator and a gas cleaner, of a by-pass up-draft pipe leading to both the generator and gas cleaner, and valve

mechanism whereby reversed draft may be admitted to the generator or the cleaned gas may be re-admitted to the gas cleaner.

5 3. In a gas producer system, the combination with a generator and a gas cleaner, of a by-pass and reverse draft pipe leading to both the generator and the gas cleaner, and a valve controlling the said pipe at the junction of its branches to the generator
10 and cleaner, whereby the cleaned gas may be by-passed into the gas cleaner, or the draft may be reversed in the generator.

4. In a gas producer system, the combination with a gas cleaner, of an exhauster
15 for drawing the gas therethrough, a gas delivery outlet, a by-pass conduit through which the cleaned gas may be forced back into the gas cleaner by the exhauster, and a valve subject to and adapted to be opened
20 by the pressure of the cleaned gas to automatically regulate or control the by-passing of the cleaned gas through the by-pass conduit.

5. In a gas producer system, the combination with a gas generator and a gas cleaner, of an exhauster for drawing the gas through the generator and cleaner, a gas delivery outlet, a by-pass conduit subject to access of the cleaned gas which conduit leads back to the generator and also to the gas cleaner, valve means whereby reversed draft may be admitted from said by-pass conduit into the generator or the cleaned gas may be re-admitted to the gas cleaner, and a valve subject to and adapted to be opened by the pressure of the cleaned gas to automatically regulate or control the by-passing of the cleaned gas through the conduit.

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

GUSTAF AKERLUND.

Witnesses:

C. P. WOOD,
HERBERT A. SAGE.