

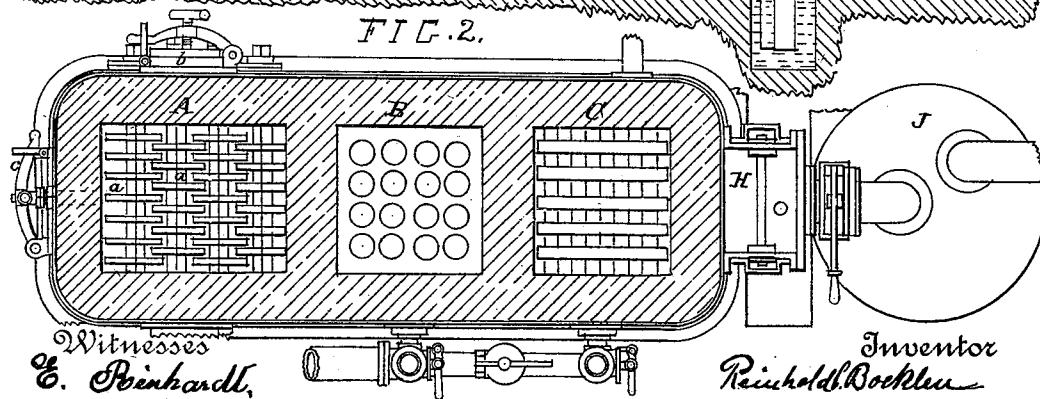
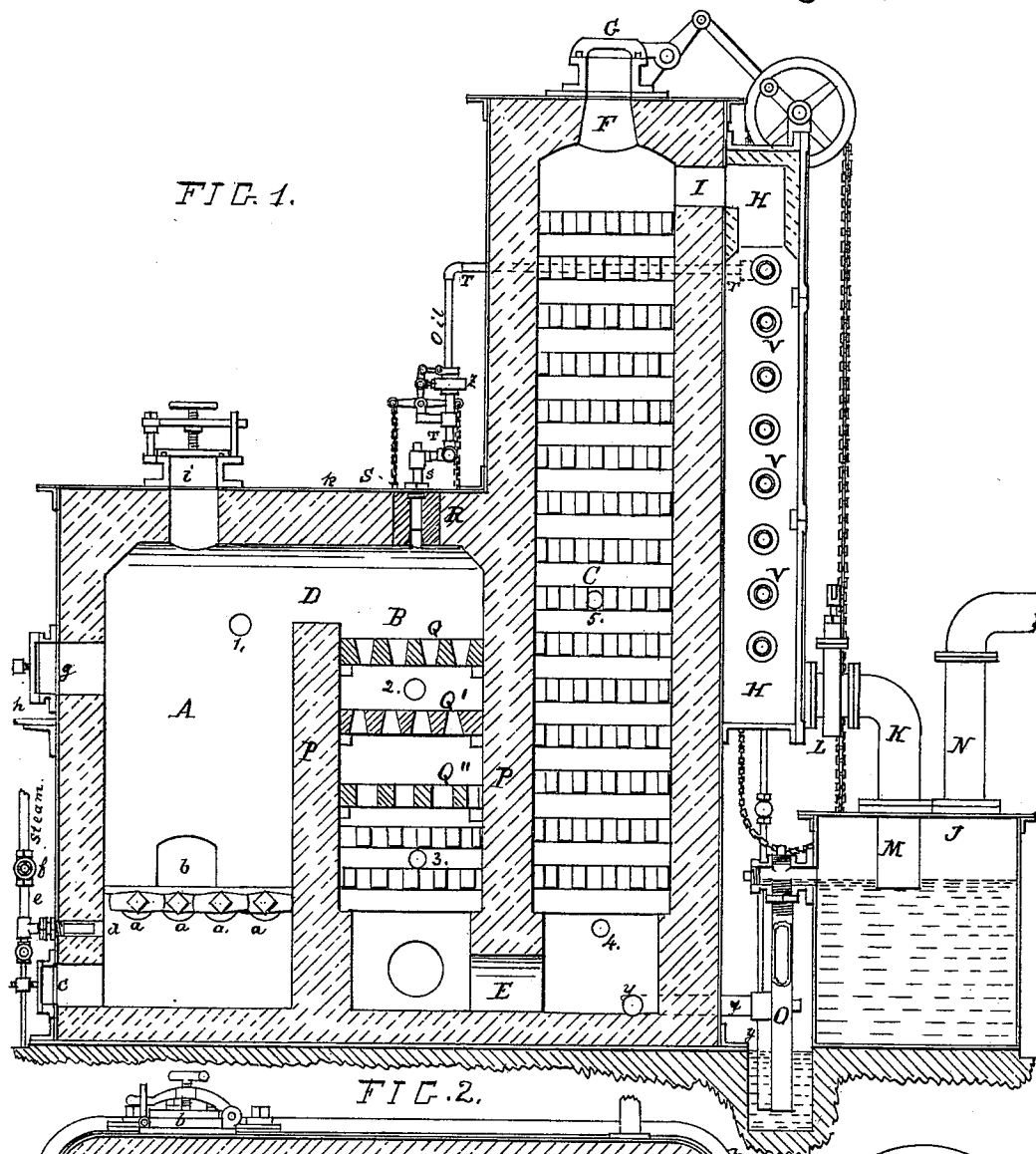
(No Model.)

2 Sheets—Sheet 1.

R. C. BOEKLEN.
WATER GAS GENERATOR.

No. 544,454.

Patented Aug. 13, 1895.



Witnesses
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Inventor
R. C. Boeklen

(No Model.)

2 Sheets—Sheet 2.

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FIG. 4.

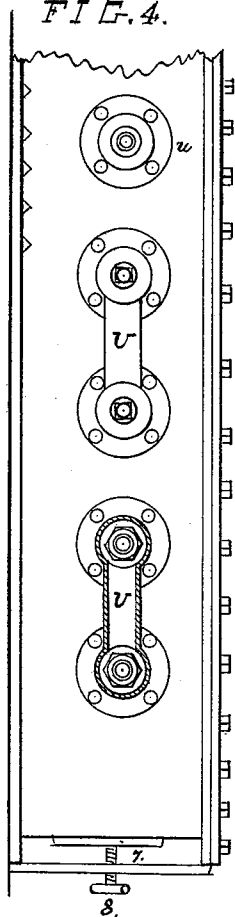


FIG. 3.

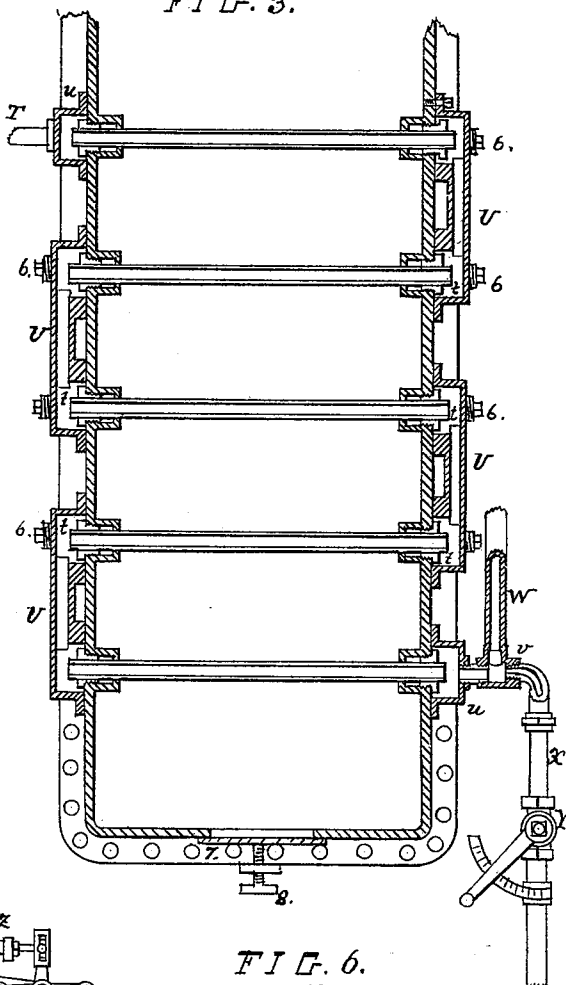


FIG. 5.

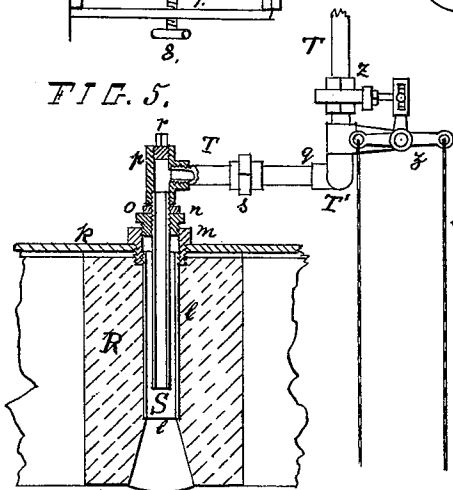
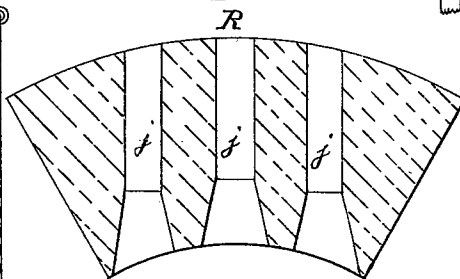


FIG. 6.



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UNITED STATES PATENT OFFICE.

REINHOLD C. BOECKLEN, OF BROOKLYN, NEW YORK.

WATER-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 544,454, dated August 13, 1895.

Application filed February 7, 1895. Serial No. 537,633. (No model.)

To all whom it may concern:

Be it known that I, REINHOLD C. BOECKLEN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State

of New York, have invented certain new and useful Improvements in Water-Gas Generators, of which the following is a specification. This invention relates to a similar water-gas process and apparatus described in my

patent dated October 18, 1892, and numbered 484,730.

The object of this invention is with improvements of the apparatus to have a superior and positive operation of generating, enabling to manufacture special high-candle-power gas with limited expense.

One essential feature of the invention relates to the combination of the generator with a gas-outlet chamber in which the oil for gas making is preheated by the outgoing fixed gas and passes up through a series of pipes arranged laterally above one another from pipe to pipe and from those of the less heated portion to the more heated portion of said chamber, and is from the most heated of said pipes conducted to pass into the carbureting-chamber of the generator to meet the generated hydrogen superior highly heated and in passing with it through the fixing-chamber is fixed

with high-candle power. By means of passing the oil in a zigzag course through the highly-heated outlet-gas the oil is subjected to hard rubbing, and upon the surfaces of the heated pipes causing a superior high-temperature vaporization before meeting the hydrogen without expense for fuel for the same.

A secondary feature relates to the novel construction of the said gas-outlet chamber with said lateral oil-heating pipes and passages from pipe to pipe in manner to provide for cleaning said pipes or their removal for new pipes with great facility.

Other essential features relating to other parts of the generator are hereinafter more fully set forth in the specification and claim. In the accompanying drawings, annexed to the specification, Figure 1 represents a longitudinal vertical section of a water-gas generator, gas-outlet, and wash-box connected, constructed according to my invention. Fig. 2 is a horizontal section of the same. Fig. 3 is a detached vertical lateral section of the lower

portion of the gas-outlet chamber of the same on a larger scale than before, and showing more specially the oil-heating pipes through the same. Fig. 4 is a side elevation of the same. Fig. 5 is a detached sectional elevation of the oil-nozzel and connections for passing the heated oil into the carbureting-chamber. Fig. 6 is a detached lateral section of the tile through which the oil-nozzles pass.

Similar letters and numerals of reference indicate corresponding parts in the several figures.

The letter A of reference indicates the fuel-chamber; B, the carbureting-chamber; C, the fixing-chamber, which extends above the other chambers, and all are inclosed by one shell lined with fire-brick inside and two strong solid fire-brick partition-walls P and P', which divide the carbureting-chamber from the fuel and fixing chambers. The tops of the fuel and carbureting chambers are protected by one brick arch under which they connect by a large flue D. The bottom of the carbureting-chamber connects, by an arched flue-opening E, with the fixing-chamber, which has an arched top with a central blast-opening F, furnished with the stake-valve G. To the rear side of the fixing-chamber is attached the gas-outlet chamber H, connecting with the fixing-chamber by the flue I below the arch of said chamber; and the gas-outlet chamber is a flat right-angular vertical chamber passing along the rear side of the fixing-chamber down within a short distance to the top of the wash-box J, which is connected to the lower end of the gas-outlet chamber by the elbow-pipe K, the gate-valve L, and the dip-pipe M. To the top of the wash-box is attached the gas-outlet pipe N, which delivers the gas to the scrubber, and from it it is delivered to the gas-relieve holder. The wash-box is furnished with the overflow-pipe O, which is adjustable to suit the pressure of the holder.

The fuel-chamber.—The fuel-chamber A is furnished with the several rotating grate-bars a for raking the fire, which each is operated by socket-arbor passing through the side of the chamber and passing through a stuffing-box to operate them from outside. On the opposite side of the chamber above the grate is provided a clinker-door b. The ash-pit below the grate is made at the front side with the

ash-seal door *c*, and above it on the front side is provided the steam-nozzle *d*, furnished with the steam-supply pipe *e*, which is connected with a regulating-valve *f* and also with a wet-steam separator or steam-trap. (Not shown.) At a suitable height above the grate is made the fuel-supply seal-door *g*, and below it is arranged the fuel-platform *h* at the front of the generator. An opening and seal door *i* is provided in the top of the fuel-chamber for clearing clinkers in the fire. Either on the side or front of said chamber is made a main blast-opening below the grate and a secondary small opening *l* above the fuel.

The carbureting-chamber.—The carbureting-chamber B has a horizontal perforated top tile Q a little below the bottom of the fuel-opening D. Upon this tile Q the products of the oil and steam or hydrogen meet and are driven through the perforations of it, and for the introduction of the oil and vapors is masoned in the arch top over the carbureting-chamber a suitable tile-arch block R, (shown in Figs. 1, 5, and 6,) with vertical openings *j, j, j*, into which the oil-nozzles S S S are projected. Said openings are made flaring on the lower end to distribute the discharge over the tile Q, in which the perforations are made conical and larger at the top surface than at the bottom surface. A second perforated tile Q' is located a short distance below the first with reverse conical perforations, as shown, and below the second perforated tile is located a third horizontal tile Q'' with large, nearly of equal diameter, openings, as shown. Below this latter tile the chamber is built with checker-brickwork down to within a suitable distance above the bottom of said chamber for a space to mix the products of oil and hydrogen, after which they pass through the arch-flue E into the fixing-chamber and through the checker-brickwork with which said fixing-chamber is provided to fix the gases. The carbureting-chamber has a blast introduction opening 2 in the upper portion and a second 3 at the lower portion of this chamber, and a blast-opening 4 is provided below the bottom and a second opening 5 about at one-third of the height of the checker-brickwork of the fixing-chamber.

It is very frequent in water-gas generators that the operation of making gas is interrupted and stopped on account of the oil-nozzles and their connection becoming clogged or fail to operate. It is therefore of importance that the construction of the oil-nozzle and connection be of a superior construction, which is shown more distinctly in Figs. 5 and 6, in which *k* represents the sheet-metal top of the shell of the generator. Under it, at the proper location over the carbureting-chamber, is located the tile R, with the openings for the oil-nozzles S. Into each opening *j*, with exception of its flaring portion, is inserted a casing-tube *l*, secured by its threaded top end to a threaded bush-fitting *m*, and the

bush-fitting *m* is fitted and screwed into the metal top R. The oil-nozzle S is smaller than the casing-tube *l*, and its upper end has a long threaded portion with a bush-fitting *n* and a lock-nut *o* over it. To the top end of the nozzle is attached a threaded T-fitting *p*, with a screw-plug *r* in its top end opposite the nozzle.

The bush-fitting *n* is fitted and secured into the bush-fitting *m*, and to the branch of the T-fitting *p* is fitted the last nipple-fitting of the oil-supply pipe T, which is part and connects with the oil-pipes attached to the gas-outlet chamber. For the supply of the several oil-nozzles S the pipe T has a horizontal portion T', which, opposite each nozzle, is furnished with a T-fitting *q*, and from it is connected with the respective T-fitting *p* by two pipe-nipples with a ground-joint brass union-fittings *s*, so that by these means, and removing the plug *r* and inserting a proper rod, the oil-nozzle may be cleared from its clogging, or by detaching the union-fitting *s* the nozzle with its bush-fitting *n* may be withdrawn and repaired, or, if required, the casing and nozzle may be withdrawn, so that in any event of the oil-nozzle clogging it may be quickly repaired without much interruption of the operation of the generator. The gas-outlet chamber H projects a short distance from the rear side of the generator, to which it is attached by bolts or rivets gas-tight. Its rear side is covered by plates bolted to the flanges, with which its sides, top, and bottom are provided. Said chamber has a series of oil-heating pipes V, arranged horizontal and lateral, passing at equal distance through both sides and above one another, as shown in Figs. 3 and 4. Each junction of each side with the oil-pipe passing through it is provided with a socket and in it with a stuffing-box gland *t* over the pipe to prevent any leakage through the side at each junction, and over each two ends of the oil-pipe on one side and alternately over the following ends on the other side is employed a cap V, which conducts the oil from a pipe below to the next above. Of these pipes the bottom or lowest heating-pipe V has over its end a circular cap *u*, to which the oil-supply pipe W from the oil-pump is connected by a T-fitting *v*, of which one end connects with the said cap *u*, the opposite end connecting with a steam-pipe X, and its branch end with the oil-pipe W. Said steam-pipe X has a reduced discharge end to supply a small flow of steam, which is regulated to an accurate small amount by the graduating-cock Y. The top or last heating-pipe V has over its discharge a cap *u*, which is connected with oil-pipe T and the oil-nozzles S S. The pipe T has near the nozzles S a suitable gate-valve Z, which is operated by a three-armed lever *z*, and two suspended cords or chains to stop the flow to the nozzle whenever required from the operating-floor quickly. The fixed gases enter from the fixing-chamber through the flue I into the upper part of the gas-outlet

chamber H and imparts its most intense heat to the top oil-pipes V and the less heat to the lowest pipes V before passing out to the wash-box. Each cap V is furnished with a screw-plug 6 for cleaning the respective oil-pipe V, and each pipe V may be removed and a new pipe replaced in case such pipe becomes unfit for use. The oil passing through the oil-pipes V first meets the lowest heat in the chamber H. It passes on in a zigzag course up through the chamber H and from a less heated pipe to a more heated pipe. Its passage is greatly interrupted by friction and increased pressure. Consequently the oil is subjected to a high strain and temperature, causing a rapid vaporization, and entering the carbureting-chamber is readily gasified and fixed. By introducing steam with the oil in the oil-heating pipes the oil is prevented from carbonizing in said pipes. The upper part of the chamber H is lined with clay or fire-tile, as shown, to prevent the blast overheating the top oil-pipe. With the bottoms of the carbureting and fixing chambers is connected the sealed overflow-pipe y, to clear said bottom from any accumulated oil or tar, and to provide an outlet in case of any stoppage of the discharge of the gas and permit of a positive or locked seal at the stake-valve. To provide against leakage of the stake-valve, said valve is operated, as shown, by a crank and pitman and a sheave-wheel, over which a chain is suspended to reach from the operating-floor. By these means the operator can lock the purge or stake valve in setting the crank on its center and also lock it from falling closed untimely. On the chamber H are provided suitable openings covered by plates 7 and firmly closed by pressure-screws 8 for the purpose to clean said chamber.

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

In a gas generating apparatus the combination consisting in a cupola of oblong flat-sided cross-section with one high fixing chamber, and two lower chambers consisting of a fuel and a carbureting chamber and all inclosed at top, bottom and sides with one shell lined with fire-brick, and said chambers separated

by two vertical cross-walls, and having to said fixing chamber a vertical flat three-sided oil heating chamber attached which connects at its upper end, and through the rear side of and with the fixing chamber, and having through it and its narrow sides a vertical row of horizontal oil heating pipes connected alternately, one pair with the following pair above, to pass the oil through them, in an upward zig-zag course, and the lower end of said pipes connected to an oil pump, and the top end to the oil nozzles of the carbureting chamber, and the bottom end of said oil heating chamber connected with the wash-box of the apparatus, said fuel chamber and carbureting chambers connected by a flue above their dividing wall, and the carbureting and fixing chamber by a flue through the base of their division wall, and said fuel chamber having a grate with an ash-pit below it, with a steam and blast inlet, and an ash-pit seal-door, and above the grate a space for a large fuel bed with two opposite small side seal doors for drawing clinkers, and with one large clinker seal door centrally at the top of said chamber, and a fuel seal door at the front side above the fuel bed space; and said carbureting chamber furnished with oil nozzles through its top, and built with checker brick and carbureting tiles; and said fixing chamber furnished with checker brick work for fixing the gases, and with a purge valve for the escape of the products of combustion, and a gas out-let from its side into said oil heating chamber, and with branch blast connections for the several chambers to be heated, and with stop valves and sight cocks for each, to promote ignition of the products of combustion simultaneously and rapid heating, substantially as and for the purposes herein specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this February 1, 1895.

REINHOLD C. BOECKLEN.

Witnesses:

E. RIENHARDT,
H. HERTER.