

(No Model.)

C. R. COLLINS.  
APPARATUS FOR MAKING WATER GAS.

No. 583,671.

Patented June 1, 1897.

Fig. 3

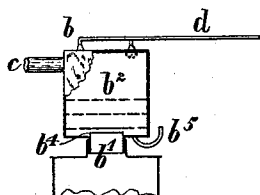


Fig. 1

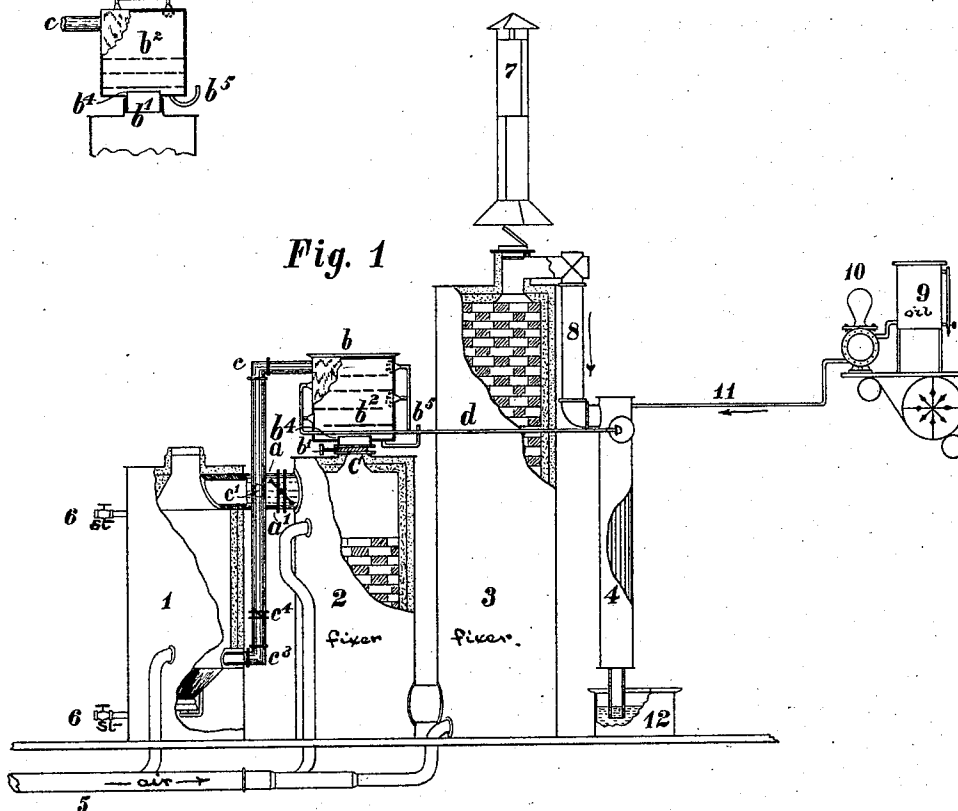
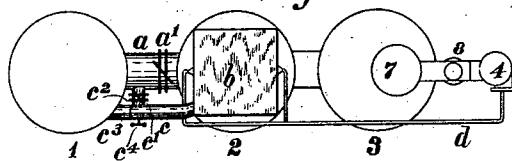


Fig. 2



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CHARLES RUSSELL COLLINS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR  
TO THE UNITED GAS IMPROVEMENT COMPANY, OF SAME PLACE.

## APPARATUS FOR MAKING WATER-GAS.

SPECIFICATION forming part of Letters Patent No. 583,671, dated June 1, 1897.

Application filed January 8, 1895, Serial No. 534,173. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES RUSSELL COLLINS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Making Water-Gas, of which the following is a specification.

One object of my present invention is to attain a uniform and proper carburization of the water-gas and to obviate destructive heating of the hydrocarbon vapor and its consequent cracking and deposition in the form of lamp-black or tar upon the refractory material or checker-work or other interior filling of the fixing-chamber or other part of the apparatus that is heated by means of the gaseous products when the air-blast is driven through the apparatus; and to this end my invention consists of the improvements hereinafter described, particularly referred to in the claims, and illustrated in the accompanying drawings, forming part hereof, and in which—

Figure 1 is a side elevational view, partly in section, showing apparatus embodying features of my invention in application to a well-known type of water-gas plant. Fig. 2 is a top or plan view of a portion of the apparatus illustrated in Fig. 1, showing features of my invention; and Fig. 3 is an elevational view, partly in section, illustrating a modified embodiment of my invention.

In the drawings, 1 is a generator.

2 is a fixing-chamber provided with checker-work and a lining of refractory material, and communicating with the generator—for example, by a pipe or conduit *a*.

3 is a second and similar fixing-chamber that may be employed and that communicates with the chamber 2—for example, by a suitable pipe or conduit—and 4 is an oil-heater.

5 is an air-blast pipe having branches to the generator and in the present instance to each of the fixing-chambers.

6 are pipes that are provided in the type of plant selected for purposes of illustration for introducing steam at the top or at the bottom of the generator, according as an up or down run is to be made.

7 is a stack that may be provided for the escape of the products of combustion that

traverse and heat by secondary combustion the interiors of the fixing-chambers 2 and 3 when the air-blast is on.

8 is an offtake for conveying carbureted water-gas away from the apparatus and through the oil-heater 4. Oil from the tank 9 is supplied under pressure—for example, by the pump 10 through the tube 11 to the oil-heater 4, where it is volatilized and subsequently used to carburet the water-gas in a manner to be hereinafter described.

The above description relates to parts of the apparatus that are adapted for use in carrying out the so-called and well-known “Lowe” process for producing water-gas by an alternating operation, which consists in first blowing air through the apparatus, the gaseous products of combustion not being collected but escaping at the stack 7, and then blowing steam, the products of reaction being collected through the offtake 8.

Having thus pointed out certain parts of a well-known type of intermittent or alternating plant for producing water-gas, I will now proceed to describe parts embodying features of my invention in connection therewith; but it must be borne in mind that my invention is not limited to the particular or specific type of apparatus shown and above described, because it is obviously applicable to other analogous types of apparatus operating in substantially the manner above referred to.

Referring to the drawings, and more particularly to Figs. 1 and 2 thereof, *b* is a separate carbureting-chamber. In the exemplification of my invention illustrated in the drawings this carbureting-chamber is mounted on top of the fixing-chamber 2 and communicates with the interior thereof through the intervention of a section of pipe or elongated neck *b'*, which may be, in effect, a detachable coupling and which may be provided with a valve or damper *C*, Fig. 1.

*c* is a pipe that communicates with the carbureting-chamber *b* and with the upper and lower portions of the generator 1. In the particular apparatus shown in the drawings this pipe *c* is provided with a branch *c'*, having a valve *c<sup>2</sup>* and communicating with the conduit or flue *a* between its valve *a'* and the generator 1 and with a branch *c<sup>3</sup>*, having a valve

$c^4$  and communicating with the lower portion of the interior of the generator. Vaporized or atomized hydrocarbon is introduced into the carbureting-chamber  $b$ . In the form of apparatus shown this result is accomplished by means of a tube  $d$ , leading from the oil-heater 4, and provided with roses, sprayers, or nozzles for spraying it into the interior of the carbureting-chamber  $b$ . As illustrated in Fig. 1, the interior of the carbureting-chamber  $b$  is provided with perforated baffle-plates  $b^2$ , that project from its opposite sides and do not extend across its interior, so that a zigzag path for the water-gas is insured, and the roses, sprayers, or nozzles are disposed so as to discharge contrary to the direction of motion of the water-gas, and one, all, or a portion only of these roses, sprayers, or nozzles may be employed according to the quality of carbureted water-gas required.

In Fig. 3 the baffle-plates  $b^2$  are disposed horizontally and extend across the interior of the carbureting-chamber, and the oil roses, sprayers, or nozzles discharge downward from the top thereof. Should tar, oil, or other fluid matter fall to the bottom of the carbureting-chamber, it is retained by the upwardly-projecting rim  $b^4$  and caused to flow outward past the seal  $b^5$ .

Although I have described perforated baffle-plates, roses, sprayers, or nozzles and an oil-retaining rim, yet my invention is not limited to an apparatus in which they (or either of them) are present.

From the foregoing description the skilful gas-engineer will readily understand the construction of my improvement or invention and the relation that the several parts thereof bear to each other and to known water-gas apparatus. Hence I will proceed to describe its mode of operation.

When the apparatus is being fired up by the admission of air, direct communication is established for the passage of the gaseous products from the generator 1 to the fixing-chamber 2—for example, by opening the valve  $a'$ —and the gaseous products of combustion, after heating the refractory checker-work of the fixing-chambers 2 and 3 by regenerative or secondary combustion, escape at the stack 7. While the apparatus is being thus heated by internal combustion, the gaseous products arising from the generator are by-passed around or excluded from the carbureting-chamber  $b$ —for example, by closing the valves  $c^2$  and  $c^4$ , opening the valve  $a'$ , and permitting them to pass through the pipe  $a$ . Under these circumstances the carbureting-chamber  $b$  is not heated internally or otherwise, it being understood that the heat radiating from the fixing-chamber is not sufficient to appreciably heat it and is not retained by it, and consequently does not heat it.

After the apparatus has been sufficiently heated in the manner above described the air-blast is shut off, the stack 7 closed, the

whereby direct communication from the generator to the fixing-chamber 2 is interrupted. Steam is then introduced at the top or bottom of the generator, as required, and according to whether an up or down run is to be made. If an uprun is to be made, the valve in the lower steam-pipe 6 is opened, the valve  $c^4$  is permitted to remain closed, and the valve  $c^2$  is opened. If, on the other hand, a down-run is to be made, the valve in the upper instead of the lower steam-pipe is opened, the valve  $c^2$  is permitted to remain closed, and the valve  $c^4$  is opened. In either case the water-gas rising from the generator 1 traverses the pipe  $c$  without loss of sensible heat and enters the carbureting-chamber  $b$ , through which it travels and escapes by way of the pipe or neck  $b'$  into the fixing-chamber 2. However, vaporized or atomized or otherwise volatilized hydrocarbon is delivered into the interior of the carbureting-chamber  $b$  by way of the tube  $d$  and from the oil-heater 4, from which it escapes under pressure.

If required, the carbureting-chamber  $b$  may be jacketed to prevent cooling of the water-gas, and the entering vaporized or atomized hydrocarbon is not subjected to sufficient heat to cause its destruction or "cracking," as it is sometimes called, but it mingles with and carburets the water-gas and is carried by and along with it into the fixing-chamber 2, thence through the fixing-chamber 3 and conduit 8, in which it imparts heat to the oil-heater, and is finally led off from the seal 12 or otherwise for use. However, if the hydrocarbon vapor upon entering the carbureting-chamber  $b$  should be broken up or cracked lampblack, hard carbon, or tar is either deposited on the baffle-plates or collected by the rim  $b^4$  and is not permitted to contaminate the checker-work that is usually provided in the interior of the fixing-chamber 2, and in either case such lampblack, hard carbon, or tar may be readily removed, either by means of the seal  $b^5$  or by the detachment or removal and cleansing of the baffle-plates and interior of the carbureting-chamber, and for this purpose the valve  $C$  may be closed and carbureting material introduced into the fixing-chamber 2, as heretofore, during the brief time required for cleaning the carbureting-chamber or for replacing it by another.

It will be obvious to those skilled in the art to which my invention relates that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth, and illustrated in the accompanying drawings; but,

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

1. In a water-gas apparatus the combination of a fixing-chamber, a separate carbureting-chamber, a neck or pipe leading from

the carbureting-chamber to the fixing-chamber and comprising a detachable coupling, a valve adapted for opening and closing said pipe or neck and carried by the section of  
5 said coupling which is applied to the fixing-chamber, a generator, and valved-pipe connections from the generator to the fixing-chamber and to said carbureting-chamber, substantially as described.

10 2. The combination with a water-gas generator, of a fixing-chamber having a separate carbureting-chamber, means for catching and removing tar, carbon and the like at the separate carbureting-chamber to prevent its

deposition upon the interior of the fixing- 15 chamber, inlet-pipes for the intermittent admission of water-gas to the top of and the exclusion of blast products from said separate carbureting-chamber and a valved conduit or pipe communicating with the generator and 20 fixing-chamber, substantially as described.

In testimony whereof I have hereunto signed my name.

CHARLES RUSSELL COLLINS.

In presence of—

EVAN J. LESTER,  
K. M. GILLIGAN.