

UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 773,781, dated November 1, 1904.

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To all whom it may concern:

Be it known that I, HENRY A. BRADLEY, a citizen of the United States, and a resident of the borough of Manhattan, in the city, county,
5 and State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Gas, of which the following is a specification.

My invention, while relating to apparatus
10 which is made use of in the manufacture of illuminating and heating gases generally, has reference more particularly to that form of apparatus in which the gases are produced by the decomposition of steam and carbonaceous
15 material—such, for instance, as hydrocarbon oils, comminuted coal, or both, and by the recombination of their elements into fixed gases—the object of the invention being to produce an apparatus of this class which in
20 addition to possessing great simplicity and the utilization of the steam which furnishes a portion of the gas when formed as the motive power for forcing the other elements with itself through the same shall insure of the
25 more thorough decomposition of the materials from which the gas is formed and the more complete union of the elements of the steam and of those materials into a fixed and permanent gas than has heretofore been possible with machines of this class as heretofore
30 in use.

To these ends the invention consists in certain peculiarities of construction and combinations of parts, all as will hereinafter more
35 fully appear.

The drawing accompanying this specification represents a complete apparatus for the production and storage of gas with my invention applied in connection therewith, the
40 generator and the burners and the generating-furnace being shown in section.

The elements used in the production of inflammable gas by my improved apparatus is water in the form of vapor or steam and some
45 carbonaceous substance, preferably a hydrocarbon oil or comminuted coal. I therefore provide my apparatus with a steam-generator or ordinary boiler A of the upright or other

approved type and use in connection therewith either coal or one of my improved generators and burners, which will be hereinafter described.

The gas is generated in a furnace B and after passing through the washer C is conducted to the holder *d*, from which it is drawn
55 through the pipe *d* for consumption. The hydrocarbon oil or other carbonaceous material is stored in a tank E and is supplied to the several generators and burners by means of a supply-pipe *e*.
60

The boiler or steam-generator A has two steam-outlet pipes *a* and *a'*, the former to supply the generator and burner, which is used beneath the boiler to generate the steam, and the pipe *a'* to supply steam to the generator
65 and burners within the furnace B, being provided with a valve *a''* to limit the supply of steam or shut it off entirely when desired.

The furnace B has at its front orifices *b* for the admission of air and is provided at its
70 rear with a stack *b'* for the passage of the products of combustion; but this latter may be closed by a damper *b''*, when required. In the upper part of the interior of the furnace is suspended a generator F, which is a shell
75 of metal or other heat-resisting material divided into three compartments, the first compartment, *f*, being to receive steam, which it does from the pipes *a'*, through the branch
80 pipe *a''*. The second compartment, *f'*, on the other hand, is to receive, through suction, a supply of hydrocarbon oil or other carbonaceous material from the supply-pipe *e*, while the third compartment, *f''*, is to receive
85 the mixed steam and oil or other carbonaceous material, which, from pressure due to the superheating of these elements in the chambers or compartments *f* and *f'*, are forced on through the pipe *f''* to the washer C. The partitions dividing the various compartments are
90 provided with openings and nipples *f'''*, so that the steam on entering the chamber *f* rushes through these nipples into the carbureting-chamber *f''*; but the force with which it enters the same and that imparted to it by further
95 superheating causes it to continue through

the nipples of the second partition and into the fixing-chamber f^2 . This movement of the steam through the carbureting-chamber f' and into the fixing-chamber f^2 carries with it the vaporized hydrocarbon oil or other carbonaceous material, and the two are thoroughly mixed in the latter chamber and converted into a fixed gas. While this transit of the steam and oil or other carbonaceous material is being effected the generator is subjected to the intense heat of the incandescent gases arising from a generator and burner G, and the constituents of the steam and oil or other material are more thoroughly fixed and converted into a permanent and stable gas.

The burner G is identical in construction with that of the generator F, with the exception that the rear wall of the fixed chamber is provided with orifices and nipples, like the partitions between the steam and carbureting chambers and between the carbureting and fixing chambers, for discharging and burning the gases issuing therefrom. It, however, receives and mixes its steam and oil or other carbonaceous material in precisely the same way as the chambers or compartments g, g' , and g^2 , but utilizes its gases immediately in heating the said generator. The nipples which form the egress from the mixing-chamber g^2 to the interior of the furnace need not lie in line with the nipples in the other partition, but may be offset, in order to allow the blast of mixed constituents to enter this chamber and circulate to some extent before leaving it. The burner G is heated and its gas ignited by a small burner H beneath it, and it receives its steam through the branch pipe a^3 and its oil or other material through the pipe e' . The burner H is in turn preferably of the same construction as that of the burner G and is located beneath it. This burner receives its steam from a branch pipe a^4 and its oil or other carbonaceous material from the pipe e^2 , and has located at its inner end a hood or deflector I, into which its blast of gas is directed and received and by which it is in an incandescent form deflected and thrown back upon the burner H itself, affording thereby the necessary heat to generate and fix the gas within the same preparatory to its use.

Beneath the burner H is placed a pan J to contain a small amount of inflammable material—such, for instance, as oil or gasolene—to heat the burner preparatory to the generation of the gas within it. When the gas is generated within the burner, it is or may be ignited by the flame arising from this pan, and the gas as thus ignited being discharged into the hood or deflector I with great violence will be deflected back upon and around the burner and serves to envelop and heat it sufficiently to continue the generation of the gas when the contents of the pan J are exhausted.

The storage-tank E is shown as being located beneath the surface of the ground; but it is obvious that it may be placed at any convenient point and the carbonaceous substance stored therein brought to the generating-point by any appropriate means or in any desired manner.

The branch pipes of both the pipes a' and e are provided with valves or cocks having gages to indicate the amount of material or steam passing through the same, and the boiler A is or may be similarly provided with the necessary pressure and water gages and safety-valves, as shown.

Within the boiler A, I have shown in dotted lines a small burner similar to the burner H and having a similar deflecting-hood for deflecting the flame resulting from the combustion of the gas issuing from its inner end back and around the burner itself, whereby the burner may be maintained at the proper degree of heat to enable it to carry on its appropriate functions.

The washer C is of ordinary construction and has its drain-cock and overflow, and the holder D is of the class usually employed to receive and contain gas until drawn off for consumption.

In the use of solid carbonaceous substances—such as coal-dust, &c.—gravity may be resorted to to supply the same to the generator and burner, although the suction produced by the steam-blast in passing through them and the superheating of the same in its transit may render this precaution unnecessary.

It is obvious that instead of using the pan J to heat the burner H a pipe may be so disposed beneath it as to supply a jet of gas from the holder D to give the burner its initial heating.

While in the drawing I have shown and in the foregoing described the burners G and H, I make no claim to those devices herein when separately considered, as the same are embodied in and form a part of the subject-matter of another application filed in the United States Patent Office of even date herewith.

Having now described my invention and specified certain of the ways in which it is or may be carried into effect, I claim and desire to secure by Letters Patent of the United States—

1. The combination, with a generator for gas consisting of a heat-resisting casing with inclosed communicating steam, carbureting, and fixing chambers for receiving, decomposing, and converting steam and carbonaceous material into a fixed gas, means for supplying steam and carbonaceous material to such generator, a gas-holder, and means for connecting the fixing-chamber of the generator to such gas-holder, of a burner arranged beneath the generator for heating the latter and similarly constructed with a heat-resisting casing and inclosed communicating steam, carburet-

ing, and fixing chambers, means for supplying steam and carbonaceous material to such burner, and means for heating said burner, substantially as described.

5 2. The combination, with a furnace, a generator for gas arranged therein and constructed with a heat-resisting casing and with inclosed communicating steam, carbureting, and fixing chambers, a gas-holder, and means for
10 connecting the fixing-chamber of the generator with the gas-holder and for supplying steam and carbonaceous material to such generator, of a burner arranged beneath the generator for heating the latter and similarly constructed with a heat-resisting casing and with
15 inclosed steam, carbureting, and fixing chambers, means for supplying steam and carbonaceous material to such burner, and a second burner for heating the first-mentioned burner,
20 substantially as described.

3. The combination, with a furnace, a gas-generator arranged therein and constructed with a heat-resisting casing and with inclosed communicating steam, carbureting, and fixing
25 chambers, a gas-holder, and means for connecting the fixing-chamber of the generator

with the gas-holder, of a burner arranged beneath the generator for heating the latter and similarly constructed with a heat-resisting casing and with inclosed communicating
30 steam, carbureting, and fixing chambers, means for supplying steam and carbonaceous material to such burner, a second burner arranged beneath the first-mentioned burner for heating the latter and likewise constructed
35 with a heat-resisting casing and with inclosed communicating steam, carbureting, and fixing chambers, means for supplying steam and carbonaceous material to this second burner, and a deflector arranged in front of this last-
40 mentioned burner to deflect the heat arising from the combination of gas discharged by such burner back upon and around the burner itself to heat the same, substantially as described.
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In testimony whereof I have hereunto set my hand this 8th day of December, 1903.

HENRY A. BRADLEY.

Witnesses:

A. S. BROWN,
R. F. SWEENEY.