(No Model.) 2 Sheets—Sheet 1.

A. B. LIPSEY.

PROCESS OF AND APPARATUS FOR MAKING GAS.

No. 286,454. Patented Oct. 9, 1883.

Fig. 1.

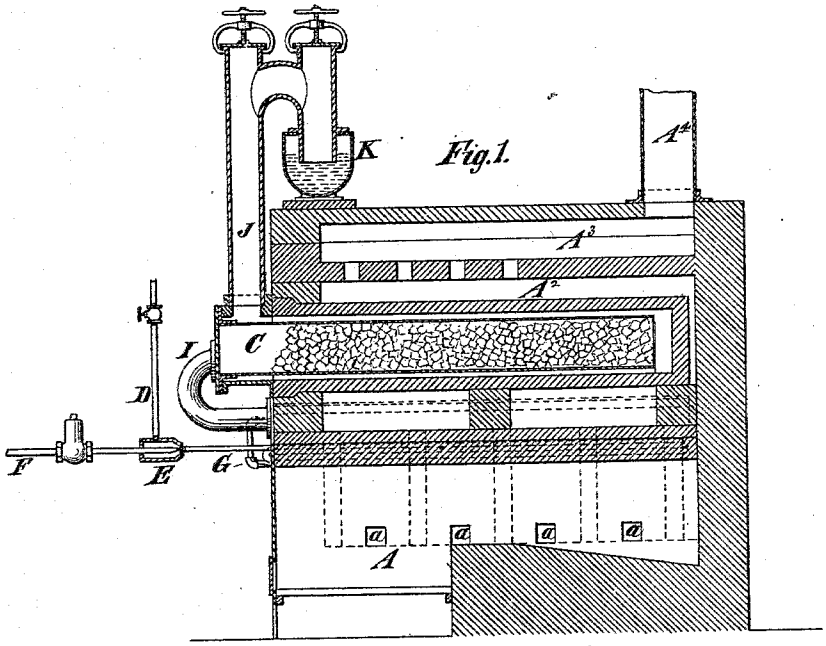


Fig. 2.

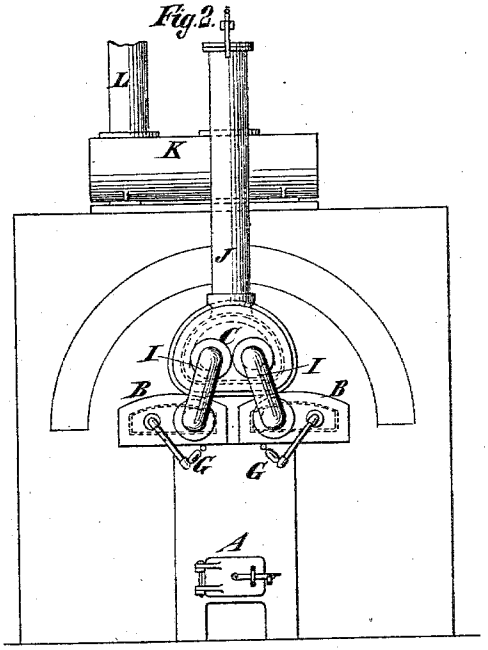


Fig. 3.

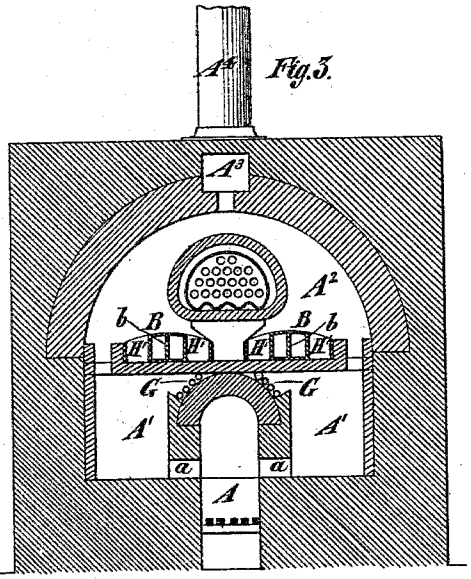
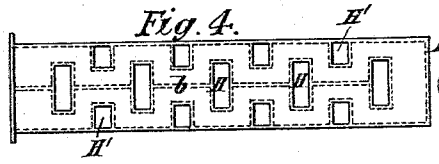


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

A. B. LIPSEY.

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Fig 5.

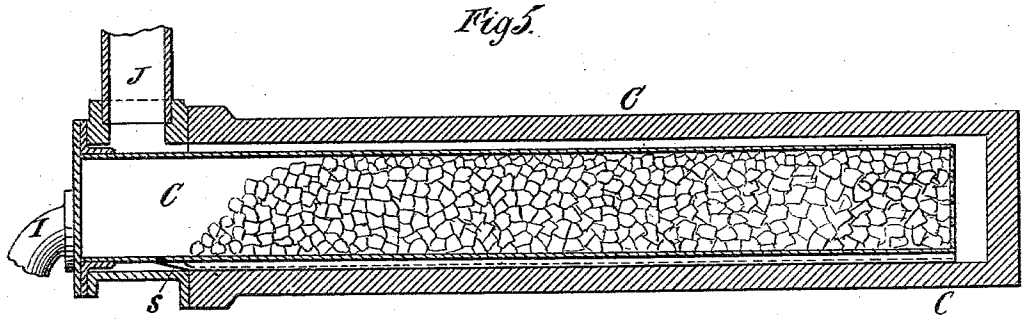
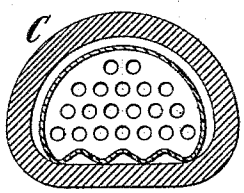


Fig 6.



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UNITED STATES PATENT OFFICE.

ANDREW B. LIPSEY, OF WEST HOBOKEN, NEW JERSEY, ASSIGNOR TO WILLIAM BELL, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 286,454, dated October 9, 1883.

Application filed January 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, ANDREW B. LIPSEY, of West Hoboken, in the county of Hudson and State of New Jersey, have invented a certain new and useful Improvement in Processes of and Apparatus for Making Gas, of which the following is a specification.

My improvement consists in a novel process of making gas by commingling steam with a liquid hydrocarbon, in subjecting them to great heat, in subsequently passing them without air through a retort containing unslaked lime, and in afterward subjecting them to a higher heat than that within the retort containing lime.

The invention also consists in a novel combination of parts in an apparatus for carrying out the above process.

The improvement also consists in a retort of novel construction.

In the accompanying drawings, Figure 1 is a central longitudinal section of an apparatus for making gas embodying my improvement. Fig. 2 is an end view thereof. Fig. 3 is a transverse section of the same. Fig. 4 is a plan of one of the retorts, and Figs. 5 and 6 are respectively a longitudinal section and a transverse section of another of the retorts.

Similar letters of reference designate corresponding parts in all the figures.

A designates the furnace of the apparatus. It has in the upper part openings *a*, through which the products of combustion escape from it into a chamber, A′, and thence into a chamber, A^2, containing retorts B C. They pass through perforations in the roof of the chamber A^2 into a flue, A^3, and they escape finally through a stack, A^4.

D designates pipes whereby a liquid hydrocarbon—as, for instance, naphtha—is supplied. They lead to injectors E, which are supplied with jets of steam by means of pipes F, and communicate with superheaters G. The steam-supply pipes are preferably provided with pressure-valves F′, for regulating the pressure of steam. The steam, by its heat, renders the hydrocarbon more liquid and draws it into the superheaters, when it is vaporized.

The superheaters G consist of pipes extending back and forth over the furnace A, and thence to the retorts B. These retorts B have central partitions, *b*, extending nearly to the rear ends; hence the superheated steam and hydrocarbon vapor pass along them on one side of the partitions to the rear ends, and then pass on the other side of the partitions to the forward ends. Tube-like passages extending through these retorts cause the steam and vaporized hydrocarbon to take a sinuous course through the retorts. These passages do not consist merely of openings in the top and bottom of the retorts, but are formed of tubes extending through the retorts and having no communication with the interior of the retorts. They may be cast in the retorts or be otherwise made integral therewith. I have shown two sets of these passages. One set, H, intersects the partitions *b*, and the other set, H′, extends inwardly from the longitudinal walls of the retorts. The passages H are arranged opposite the spaces between the passages H′, and it is owing to this arrangement that the steam and vaporized hydrocarbon take a sinuous course through the retorts. By taking this sinuous course they are made to travel a longer distance and kept a greater time subject to the influence of the products of combustion; but the passages H H′ are not advantageous for this reason only. The products of combustion enter the passages and exert a potent influence upon the steam and vaporized hydrocarbon in the retorts. From these retorts the steam and vaporized hydrocarbon pass along pipes I to the retort C. This retort consists of a shell of iron or other suitable metal arranged in a chamber, which will preferably be made of fire-clay or earthenware. The metal shell has a corrugated bottom, and longitudinal passages are thus afforded without the use of other parts beneath it. As this shell is considerably smaller than the chamber in which it is located, a space is left not only beneath the shell, but also entirely around its sides and top. The shell is shorter than the chamber; hence a space is left between its rear end and the chamber. At the rear end the shell is perforated.

The construction of the retort C and its shell is best shown in Figs. 5 and 6. The corruga-

tions in the bottom of the shell do not extend quite to the front end thereof, but stop at the point S, and between that point and the front end of the shell a space is left below the bottom of the shell, through which space the gas that comes forward in the corrugations escapes laterally from under the shell. The shell of this retort C contains unslaked lime, and the pipes I conduct the steam and vaporized hydrocarbon without any air into its outer end. The steam and vaporized hydrocarbon pass thence to the rear end of the shell; thence through the perforations at the rear end into the chamber in which the shell is contained; thence under, over, and at the sides of the shell to the outer end of the chamber. In passing on the outside of the shell to the outer end of the chamber the steam and hydrocarbon vapor are subjected to a more intense heat than that within the shell, and the conversion of the entire volume of steam and hydrocarbon vapor into a permanent or fixed gas is insured. From the outer end of the chamber the gas passes along a pipe, J, to a wash-box, K. It is conveyed away from the wash-box by a pipe, L.

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

1. The process of making hydrogen gas, consisting in commingling steam with a liquid hydrocarbon, in subjecting them to great heat, in subsequently passing them without air through a retort containing unslaked lime, and in afterward subjecting them to a more intense heat than that within the retort containing lime, substantially as specified.

2. In an apparatus for producing a fixed gas from steam and hydrocarbon, the combination, with a furnace, of a superheater and two retorts, one of which contains unslaked lime, all heated by said furnace, means for supplying steam and hydrocarbon to said superheater, and pipes connecting the superheater and retorts, all substantially as described, whereby the steam and hydrocarbon vapor are caused to pass, first, through the superheater, then through the retort which does not contain lime, and, finally, through the retort containing lime.

3. A retort having a longitudinal partition, *b*, and the tube-like passages H H′, substantially as specified.

4. The combination, with a retort-chamber, of a shell arranged within the same, extending nearly, but not quite, to the end thereof, and having a bottom which is wrinkled or fluted by the corrugating or bending of the material, so as to form passages between it and the bottom of the retort-chamber without the addition of other parts, substantially as specified.

ANDREW B. LIPSEY.

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