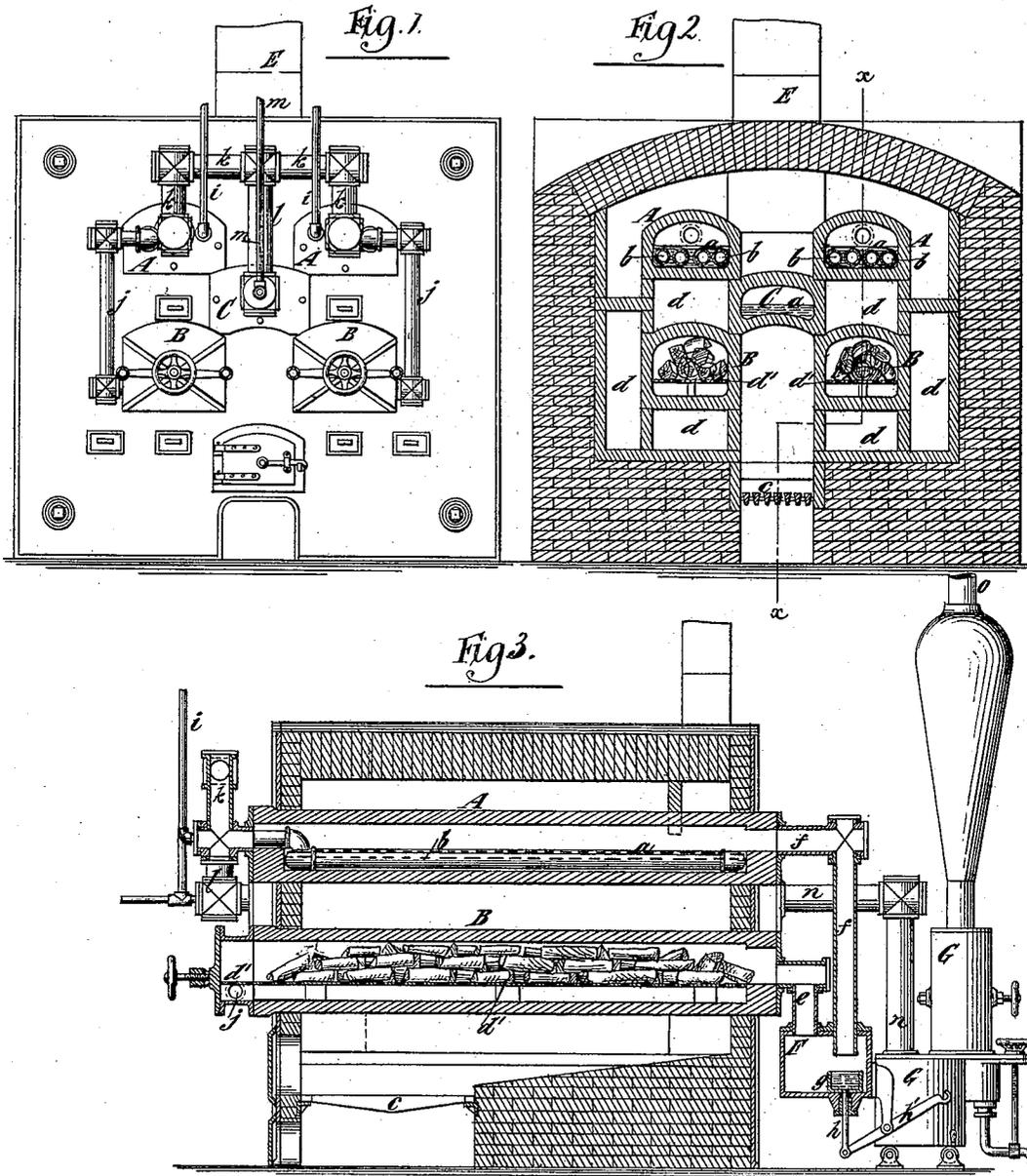


(No Model.)

W. BELL & A. B. LIPSEY.
APPARATUS FOR MAKING GAS.

No. 244,173.

Patented July 12, 1881.



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APPARATUS FOR MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 244,173, dated July 12, 1881.

Application filed February 1, 1881. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM BELL, of the city and county of New York, in the State of New York, and ANDREW B. LIPSEY, of West Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Gas, of which the following is a specification.

Our invention relates to the method of making gas by the distillation of wood and the subsequent addition to the gaseous products of distillation of hydrocarbon liquid, if necessary, to enrich the gas.

Our invention consists in the combination of a retort containing steam-superheating pipes immersed in molten metal, a second retort containing a longitudinal perforated partition-plate, upon one side of or above which wood may be distilled, a pipe for conducting superheated steam from said superheating-pipes to said second retort upon the other side of or below said perforated plate, and a pipe for conducting the products of distillation and the gases resulting from the decomposition of steam from said second retort to the retort containing molten metal.

In the operation of our apparatus the wood is first distilled, and then superheated steam is passed through the residual charcoal, and thereby decomposed, and the wood-gases and the gases produced by the decomposition of steam are finally mixed in the retort containing molten metal.

Two pairs of the above-described retorts may be employed, and in connection therewith a fifth retort, also containing molten metal, and into which the fixed gas is conducted from the two retorts containing molten metal and superheating-pipes, and has combined with it a proper quantity of vaporized hydrocarbon for enriching it.

In the accompanying drawings, Figure 1 represents a front elevation of a bench of retorts for making gas in accordance with our improvements. Fig. 2 represents a transverse vertical section of such retorts; and Fig. 3 represents a longitudinal section upon the dotted line *x x*, Fig. 2.

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

A A designate two retorts, each having the principal portion of its bottom depressed or recessed, as shown clearly in Fig. 3, so as to receive and retain molten metal *a*, such as lead, copper, tin, zinc, &c. Immersed in the molten metal are pipes *b*, through which steam may circulate and be superheated by the heat of the molten metal *a*.

Below the retorts A are arranged two other retorts, B, and between the pairs of retorts A B is arranged a fifth retort, C, as clearly shown in Fig. 2. The retorts A B C are all set in brick-work, and are heated by a furnace, of which *c* is the grate, and from the furnace the products of combustion are made to pass longitudinally back and forth through flues *d*, and finally escape through a chimney, E.

The retorts B are each provided with a longitudinal perforated partition-plate, *d'*, extending from end to end thereof, and upon or on one side of this partition-plate is placed a sufficient quantity of wood to fill the retort. The retort being highly heated, all the volatile products of the wood are driven off in the form of gas and pass from the retort at the rear end through a pipe, *e*, into a valve-box, F, from which the gaseous products of distillation pass through a pipe, *f*, into one of the retorts A, above the molten metal *a* contained therein.

Each retort B is connected with a separate valve-box, F, and in each box is arranged a cup-shaped valve, *g*, of a size to fit over the end of the pipe *f*, and containing molten metal, so as to tightly seal the pipe *f* and prevent the flow of gas through it. The valve *g* is connected by a rod, *h*, with one end of a lever, *h'*, by which the valve may be raised to close the pipe *f*, and the lever may be held by any suitable catch to retain the valve closed. Steam is supplied to the superheating-pipes *b* in each retort A by a pipe, *i*, and after being superheated passes through a pipe, *j*, and enters one of the retorts B at the front and below the perforated partition-plate *d'*, or on the other side thereof from the wood, and such steam passes up through the perforations in the plate and passes through the residual charcoal,

whereby it is highly heated and decomposed, and at the same time takes up all or a large part of the carbon contained in the charcoal. After passing from the front of the retort B to the rear thereof, the gases which result from the decomposition of the superheated steam pass through the pipes *e* and *f* into the back of the retort A, wherein they are mingled with the gaseous products of distillation and a fixed gas produced. From the front of the retorts A the gas passes through pipes *k* and a common pipe, *l*, to the front of the retort C, which contains molten metal *a*, the same as the retorts A, except that it does not contain heating-pipes. In the retort C the gas is mingled with more or less hydrocarbon vapor, if any is necessary, to enrich it and make it suitable for illuminating purposes. The hydrocarbon vapor is produced from hydrocarbon liquid, which is introduced into the retort C through a pipe, *m*, and is converted into vapor by the heat of the retort. Such liquid as is not at once converted into vapor will be converted when it falls upon the molten metal *a*. If necessary, the hydrocarbon liquid may be introduced into the retort C by an injector. The completed gas issues from the retort C through a pipe, *n*, and thence passes through a washer, G, from which it is conducted through a pipe, *o*, to the gas-holder.

The two retorts B are intended to be charged with wood alternately, and while the distillation of the wood in one retort is taking place the superheated steam is passed through the other retort and the residual charcoal deprived of its carbon.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of a retort containing steam-superheating pipes immersed in molten metal, a second retort containing a longitudinal perforated partition-plate, upon one side of or above which wood may be distilled, a pipe for conducting superheated steam from said superheating-pipes to said second retort upon the other side of or below said perforated plate, and a pipe for conducting the products of distillation and the gases resulting from the decomposition of steam from said second retort to the retort containing molten metal, substantially as specified.

2. The combination of the retorts A A, containing molten metal *a*, and superheating-pipes *b* immersed therein, the retorts B, adapted to receive wood, the retort C, containing molten metal, pipes for conducting superheated steam from said superheating-pipes *b* to the retorts B, pipes for conducting the products of distillation and gases resulting from the decomposition of steam from the retorts B to the retorts A, valves *g* for closing the pipes *f*, pipes for conducting gas from the retorts A to the retort C, and a pipe for introducing hydrocarbon liquid into the retort C, all substantially as specified.

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