(No Model.) 4 Sheets—Sheet 1.

E. J. JERZMANOWSKI.

APPARATUS FOR PRODUCING GAS.

No. 541,092. Patented June 18, 1895.

Fig. 1.

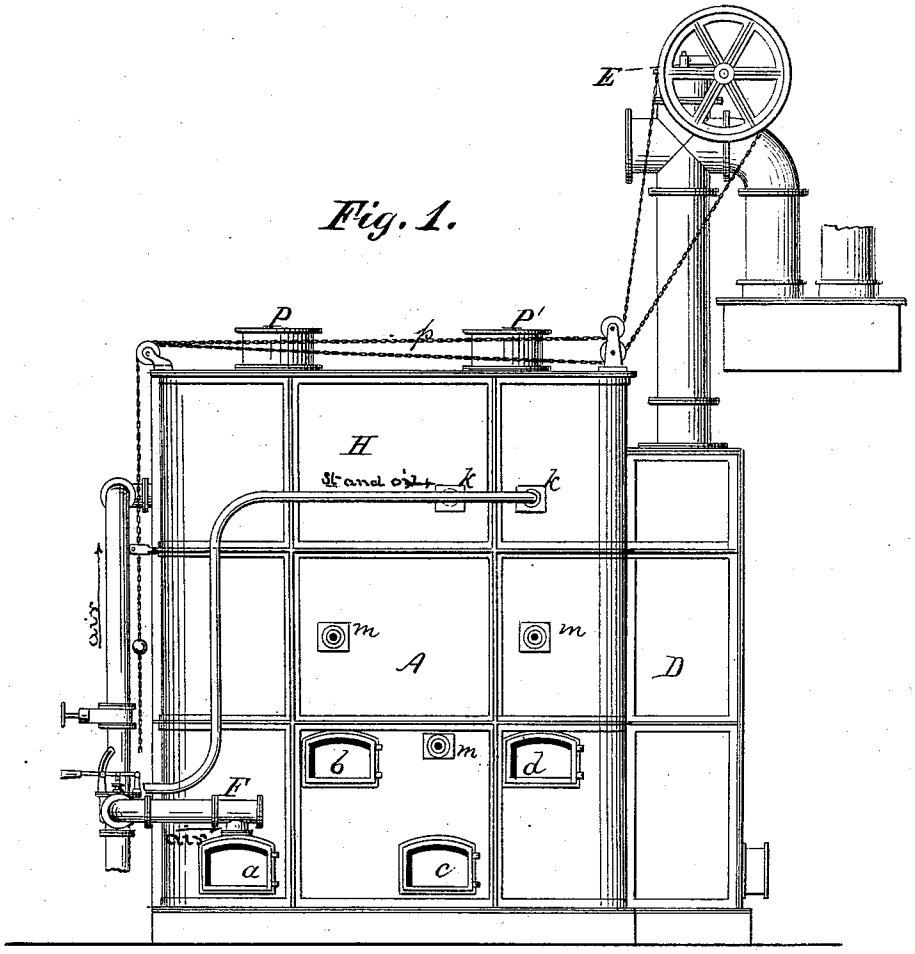

Fig. 2.

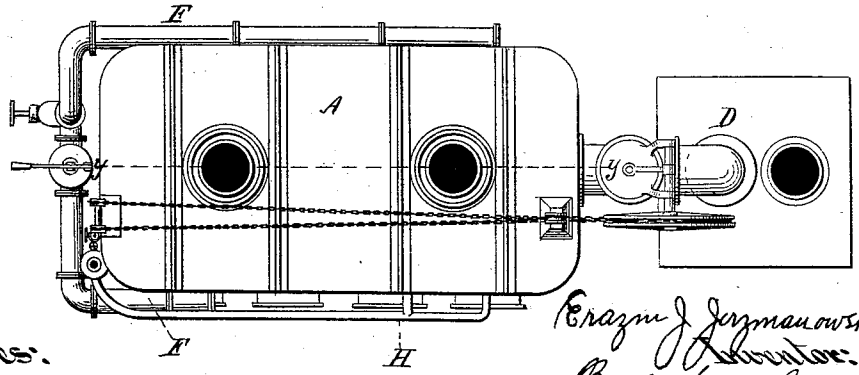

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Fig. 3.

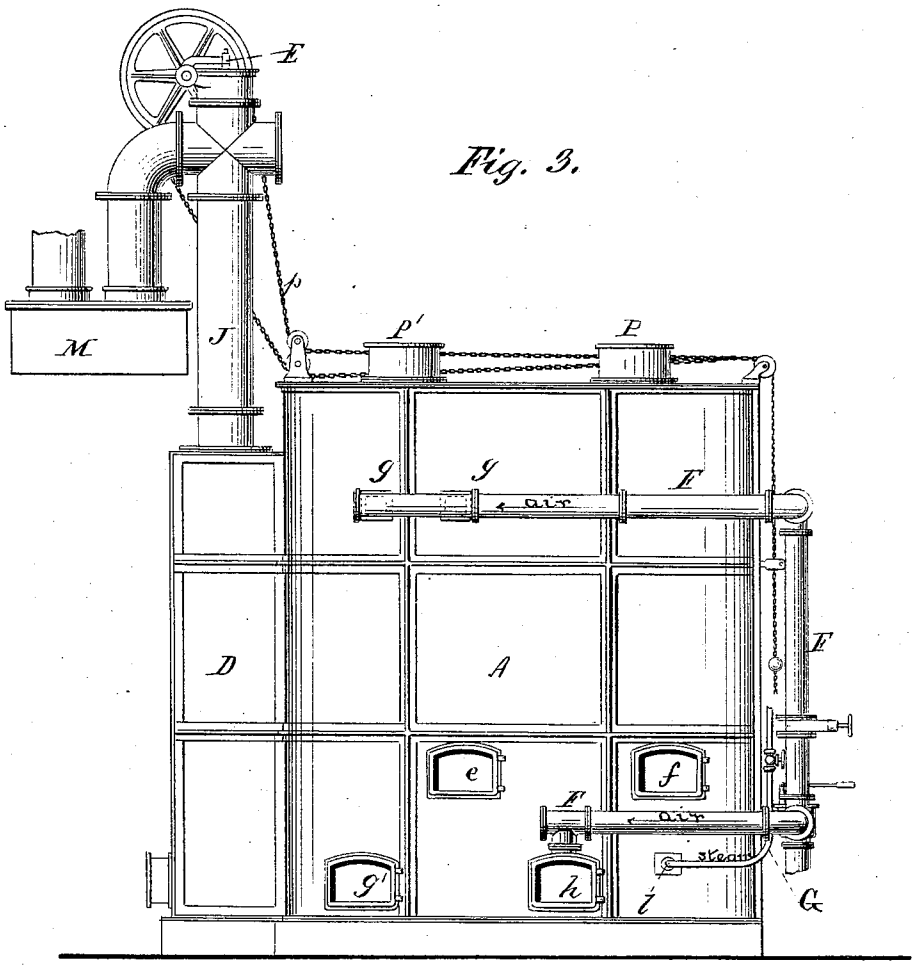

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Fig. 4.

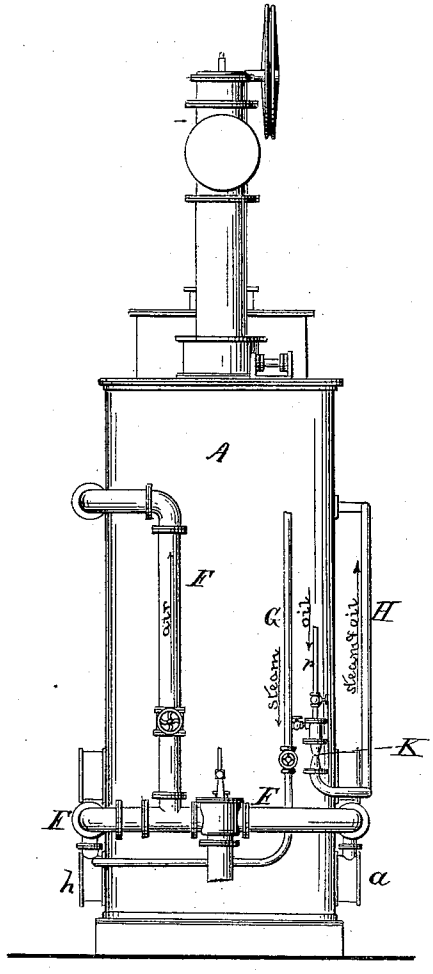
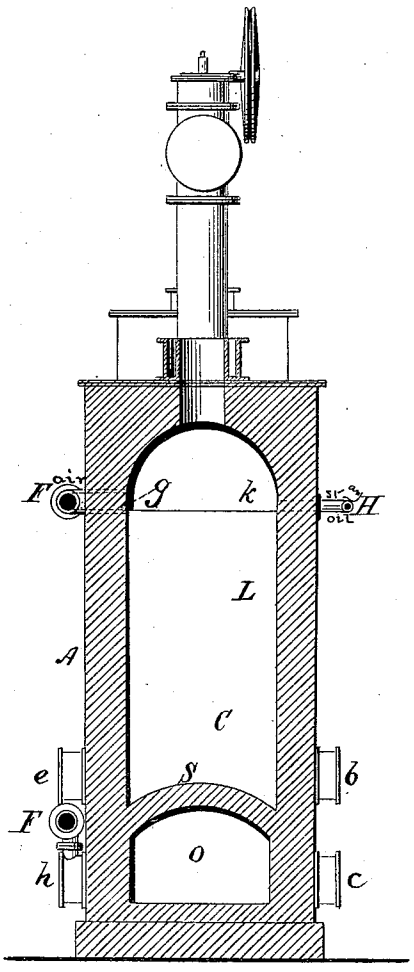


Fig. 5.



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APPARATUS FOR PRODUCING GAS.

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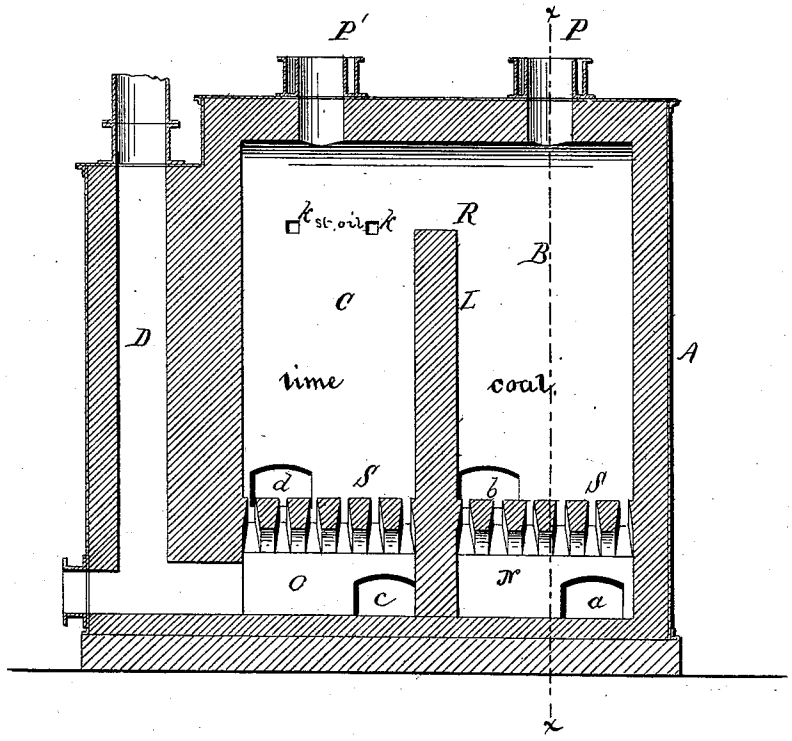
Fig. 6.



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UNITED STATES PATENT OFFICE.

ERAZM J. JERZMANOWSKI, OF NEW YORK, N. Y.

APPARATUS FOR PRODUCING GAS.

SPECIFICATION forming part of Letters Patent No. 541,092, dated June 18, 1895.

Application filed April 7, 1885. Serial No. 161,467. (No model.)

To all whom it may concern:

Be it known that I, ERAZM J. JERZMANOWSKI, of the city, county, and State of New York, have invented a new and useful Improvement in Apparatus for Producing Gas, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

The improved apparatus which I shall proceed to describe is one which is adapted for producing gas by the combined action of coal and lime upon steam, and upon steam carrying petroleum or other hydrocarbon as will be readily understood from the accompanying drawings.

The invention consists essentially in the employment of two separate chambers, one containing lime, and the other coal, by preference anthracite, so connected that the products of combustion of the coal are used by preference with an additional supply of air in heating the lime to the requisite temperature for making the conversions hereinafter to be described, while the heated body of the coal and the lime co-operate in producing the gas which may or may not be afterward enriched in the well known way. In order to accomplish this interaction of coal and lime I cause steam to pass through the body of the coal thereby making what is commonly known as "water gas," and then unite with this an additional quantity of steam carrying a hydrocarbon in suspension. The said gas is caused to pass through a body of hot lime, thereby converting the steam and hydrocarbon into hydrogen, and perhaps a certain amount of carbonic acid or carbonic acid and carbonic oxide.

In the accompanying drawings similar letters refer to similar parts.

Figure 1 is a vertical elevation of my apparatus, and Fig. 2 is a top view of the same. Fig. 3 is a vertical elevation on the opposite side from Fig. 1. Fig. 4 is an end elevation showing some of the pipe connections. Fig. 5 is a section through Fig. 6 on the line *x x*. Fig. 6 is a section through Fig. 2 on the line *y y*, the position of the apparatus, as shown, however, being reversed.

My apparatus consists generally in an external casing A. Within this are two chambers B and C. These chambers are separated from each other by the partition L, which extends from the foundation bed nearly to the top of said chambers, at which point said chambers communicate with each other through a passage R above said partition. Each chamber may be provided with an upper opening at P, P′, as shown, which are suitably closed by means of sand seals. Through these openings the chambers are charged. In the chamber B are likewise the openings *b*, *f*, above the grate bars S, whereby the chamber is readily discharged when desired. In chamber N beneath the grate bars of the chamber B are ash doors *a* and *h*. These doors are placed upon small chambers, extending out somewhat from the main structure and into their tops are the pipe connections hereinafter to be described. Opening into the chamber O beneath the grate bars S of the chamber C are the doors *c* and *g* for removing any lime which may fall through said grate bars. Toward the upper part of the chamber C on one side are the openings *k*, *k*, communicating with the steam and naphtha pipe hereinafter to be described. In the opposite wall, likewise toward the top, are the openings *g*, *g* communicating with the air pipe F hereinafter to be described. The chamber O beneath the grate bars S communicates with the large pipe or chimney D, and its extension J, the upper end of which extension is closed by a suitable valve E which is controlled by a wheel and chain *p*, as will be readily seen. Of course many other methods could be devised, but the one shown is very convenient, for by it the valve when opened can be thrown completely out of the range of the escaping gases. The pipe J likewise communicates with the hydraulic main M. An air pipe F is provided through which air is forced by a blower or other suitable mechanism into the apparatus. This pipe has three branches, one communicating with the ash door *h*, one communicating with the ash door *a*, beneath the chamber B, and the other communicating with the openings *g*, *g*, in the lime chamber C. A steam pipe G is likewise provided. One branch of this enters the ash chamber below the chamber B at *l* as shown in Fig. 3. Another connection proceeds from this pipe G to the naphtha injector K. Naphtha enters this injector through the pipe *p*. The combined steam and naphtha pass by the

pipe H through the openings *k*, *k*, at the proper period of the operation. Eye-holes *m* may be provided for observing the internal condition of the apparatus. Suitable valves are provided in all these pipes, and branches which I will not here fully describe in detail, since they will be readily supplied by a competent gas engineer.

The operation of my apparatus can now be readily understood. The chamber B is supplied with coal, preferably anthracite, and the chamber C is filled or partly filled with lime in lumps by preference about three inches in diameter. A suitable supply of steam hydrocarbon such as petroleum and compressed air is provided. Instead of naphtha or petroleum I may use some other liquid hydrocarbon, or even a finely divided solid hydrocarbon carried by a liquid or otherwise injected into the apparatus. I prefer, however, to use in this operation ordinary petroleum which is both cheap and efficacious. The anthracite coal having been kindled, air is allowed to enter through the branches of the pipe F, the quantity entering through the openings *g*, *g*, being by preference less than that entering through the openings *a* and *h*. The effect of this is to thoroughly heat the coal and lime for the products of combustion pass upward through the coal bed, and through the passage R above the lime, where they meet an additional supply of air thereby completing the combustion. The highly heated gases then pass downward through the lime in the chamber C through the chamber O, chimney D, pipe J, and thence escape through the purge valve E, which is then open. When the lime has been heated to the proper temperature, the air supply is cut off, and the purge valve E closed. Steam and naphtha are then injected through the pipe H, and openings *k*, *k*. These passing downward together through the lime bed in the chamber C become converted into an illuminating gas of low candle power, the candle power depending in part upon the amount of petroleum added. At the same time by preference, I cause a jet of steam to enter beneath the coal bed through the opening *l*. This passes upward through the coal bed, and becomes converted into water gas, and meets above the lime steam and petroleum there injected, and the combined water gas steam and petroleum pass downward through the body of the lime. The resultant gas so produced is much superior in quality to water gas containing a much less percentage of carbonic oxide, and if the process is properly managed it is itself an illuminating gas of several candle power. This gas is subsequently enriched, if it is to be used as an illuminating gas by a hydrocarbon in the usual way. When the lime or coal has become so much cooled by this action as to cease to act efficaciously, the steam and combined steam and naphtha are shut off and air is again admitted. By means of the alternate doors above the grate bars, the apparatus is readily discharged in case of need, and the supply of coal and lime is readily kept up through the openings above.

The apparatus is compact and convenient, and is not liable to injury or destruction.

I do not in this application claim the process, having made a separate application therefor.

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

In an apparatus for producing illuminating gas, the combination in a single structure of a chamber for containing a body of coal, a chamber for containing a body of lime, a partition separating the two chambers extending from the base of the generator to near the top leaving a space whereby the two chambers are made to communicate, an air pipe connected to the chamber for containing the body of coal and delivering below the position of that body, an air pipe connected to the chamber for containing the body of lime and delivering above that body, a steam pipe connected to the chamber for containing the body of coal and delivering below that body, and a steam and oil pipe connected to the chamber for containing the body of lime and delivering above said body, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERAZM J. JERZMANOWSKI.

Witnesses:

GEO. H. EVANS,

WM. A. POLLOCK.