

(No Model.)

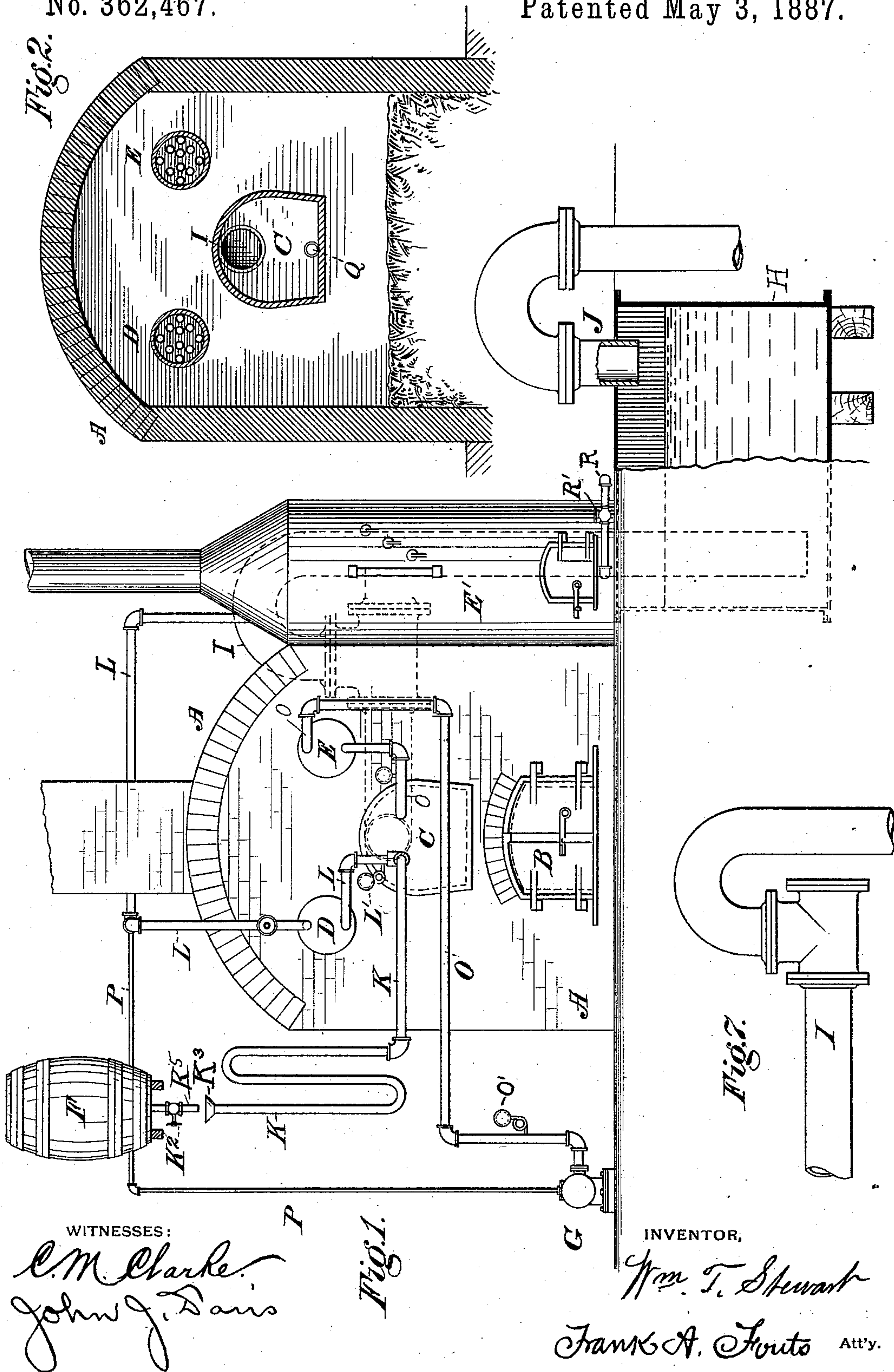
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APPARATUS FOR GENERATING AN ILLUMINATING AND HEATING GAS.

No. 362,467.

Patented May 3, 1887.



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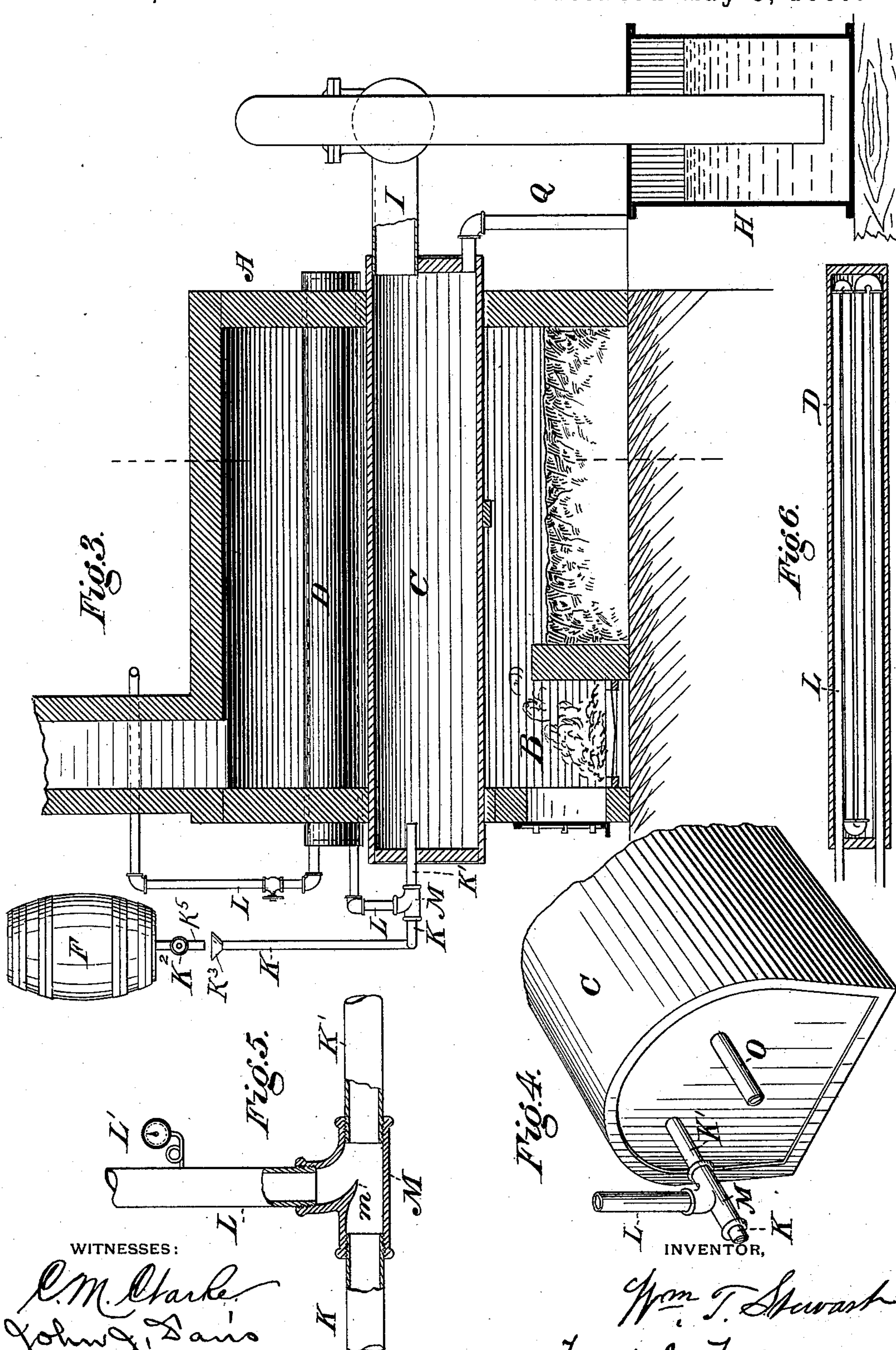
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WITNESSES:

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INVENTOR,

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Att'y.



# UNITED STATES PATENT OFFICE.

WILLIAM T. STEWART, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF TO WILLIAM H. DENNISTON, OF SAME PLACE.

APPARATUS FOR GENERATING AN ILLUMINATING AND HEATING GAS.

SPECIFICATION forming part of Letters Patent No. 362,467, dated May 3, 1887.

Application filed January 24, 1887. Serial No. 225,314. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM T. STEWART, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in an Apparatus for Generating an Illuminating and Heating Gas; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an apparatus for generating an illuminating and heating gas, all of which will be fully hereinafter specified, and pointed out in the claim.

In the accompanying drawings, Figure 1 represents a front elevation of the gas-generating apparatus. Fig. 2 is a transverse vertical section of the furnace, retort, chambers, pipes, and boiler. Fig. 3 represents a central vertical longitudinal sectional view. Fig. 4 is an end perspective view, in fragments, of the retort. In this view the Y-shaped pipe-coupling is shown, which connects the steam and oil pipes. The retort end of the air-pipe is also shown. Fig. 5 is an enlarged sectional view of the Y-shaped coupling and connected pipes. Said coupling and the short pipe or nozzle connecting it with the gas-generating retort constitute an injector. Fig. 6 is a central longitudinal sectional view of the steam-superheating chamber and the steam return-pipes therein, and Fig. 7 is a detail of the pipe which connects the retort and washer. This pipe is provided with a T-fitting, the head of which is removable, so that access may be had to the interior of the pipe for cleaning the same.

Like letters indicate like parts in the several views.

The letter A represents the brick-work, in which is located the furnace B. Within said brick-work, and immediately above the furnace, is a D-shaped retort, C. Also within said brick-work, and located above the retort, are two (2) pipes or chambers, D E. The retort and chambers D E are preferably constructed of German clay, so as to more readily withstand the intense heat to which they are subjected.

Said pipes and retort lie parallel lengthwise of the furnace frame-work, and they are immediately subjected to the heat and flame arising from the furnace.

E' represents the boiler located at one side of the brick frame-work.

F indicates a tank provided with hydrocarbon.

The letter G indicates an air-compressor.

H is a washer located in the rear of the generating apparatus. Said washer is preferably provided with water. A pipe, I, is connected at one end with the upper rear end of the retort. The other end of said pipe enters the washer, and extends nearly to the bottom thereof. By means of said pipe, which is open at both ends, communication is established between the retort and washer.

J represents a pipe one end of which opens into the washer above the liquid therein. The other end of the pipe J opens into and communicates with the gas-holder. Said holder is not shown in the drawings.

K<sup>5</sup> represents a short pipe connected to and communicating with the under side of the oil-tank F.

K represents a pipe provided with a funnel, K<sup>3</sup>, on its upper end. Said funnel is immediately under the lower end of the pipe K<sup>5</sup>, with a space intervening, whereby the quantity of oil flowing from the tank through the pipe K<sup>5</sup> may be observed.

K<sup>2</sup> represents a stop-cock in the pipe K<sup>5</sup> for regulating the flow of oil from the tank. By means of the pipes K<sup>5</sup> K oil may be conveyed from the tank to the retort.

L indicates a steam-pipe, which communicates at its upper end with the boiler. The lower end of said pipe communicates with the injector M, which is located near the head of the gas-generating retort.

K' represents the injector's nozzle. This nozzle opens into the head of the gas-generating retort. The injector is internally screw-threaded at its open ends and side for the reception of the externally screw-threaded ends of the connected pipes and nozzle.

K represents one of said pipes, which conveys the oil into the injector, and L the pipe which conveys the steam therein. The inner



side of the injector is provided with an inwardly-inclined flange, *m*, which tends to deflect the steam from the pipe *L* into the nozzle *K'*. The oil and steam commingle at the point *m* in the injector and pass together into the gas-generating retort.

The large clay pipe *D*, or chamber, is provided with a series of parallel return-pipes. The ends of these pipes are connected and communicated so as to form a continuous pipe, the induction and discharge ends whereof are connected to the steam-pipe *L*, and form a part and continuation thereof, whereby steam admitted from the boiler into the pipe *L* is first conveyed through the series of small pipes in the chamber *D*, and thence conveyed to the retort.

The letter *O* represents an air-pipe leading from the air-compressor *G* to the induction-pipe which forms one of a series of pipes in the chamber *E*. Said chamber *E*, like its counterpart *D*, is provided with a series of return-pipes so connected as to form a continuous pipe, the induction and discharge ends whereof engage and communicate with the air-pipe *O*. The extreme outer end of said pipe *O* enters into and through the front head of the retort. By this means the air from the compressor is passed through the pipe *O*, superheated by its passage through the return-pipes in the chamber *E*, and thence passed on and discharged into the retort. A small steam-pipe, *P*, connects the main steam-pipe *L* with the air-compressor *G*, for the purpose of actuating the pump of the latter.

*Q* represents a small waste-pipe connected to and leading from the rear end of the retort.

*O'* represents a gage on the pipe *O*, immediately above the compressor, and *L'* indicates a gage on the steam-pipe.

The letter *R* represents a pipe connected at one end with the gas-pipe *I*, and at the other with the boiler. This pipe is provided with a stop-cock, *R'*. The object of said pipe is to convey a gas-fuel from the pipe *I* to the boiler. The steam, oil, air, and waste pipes herein specified are provided with suitable stop-cocks and regulating-valves.

The operation of the invention is as follows: A fire is started in the furnace *B* under the retort, and also in the fire-box in the boiler.

The furnace-fire heats the retort, chambers *D* *E*, and their inclosed pipes. The steam from the boiler is admitted through the pipe *L* into the series of return-pipes in the chamber *D*, whereby said steam is superheated. The steam is then passed on through the pipe *L* into the injector, and thence through the nozzle *K'* into the retort. At the same time oil is permitted to flow from the tank *F* through the pipes *K<sup>5</sup>* *K* into the injector, where it commingles with the steam, and both oil and steam, by the superior pressure of the latter, are forced into the retort. At the same time a supply of air is forced from the compressor into and through the return-pipes in the air-heating chamber *E*, whereby the air is subjected to an intense heat. On leaving the chamber the heated air passes through the pipe *O* and enters the retort.

The superheated steam and the air in their passage through the retort become impregnated and commingle with the carbonaceous vapor arising from the hydrocarbon, and the resulting gas passes out of the pipe *I* in the rear end of the retort, and it is then passed through the washer, and thence out of the pipe *J* and into the gas-holder.

I am aware that prior to my invention hydrocarbon oils, steam, and atmospheric air have been combined for the production of a heating and illuminating gas.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

A gas-generating apparatus consisting in the combination of a furnace, a gas-generating retort, and an injector connected therewith, a steam-superheating chamber provided with a series of return-pipes, a steam-pipe connecting the discharge end of said return-pipes with the injector, an oil-supply pipe connected with said injector, and an air-heating chamber also provided with a series of return-pipes, the discharge end of said air-pipes being connected by pipe with the gas-generating retort, substantially as described, and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM T. STEWART.

Witnesses:

FRANK A. FOUTS,  
H. L. CHRISTY.