T. G. SPRINGER.

Process and Apparatus for the Manufacture of Gas.

No. 196,495. Patented Oct. 23, 1877.

Fig. 1.

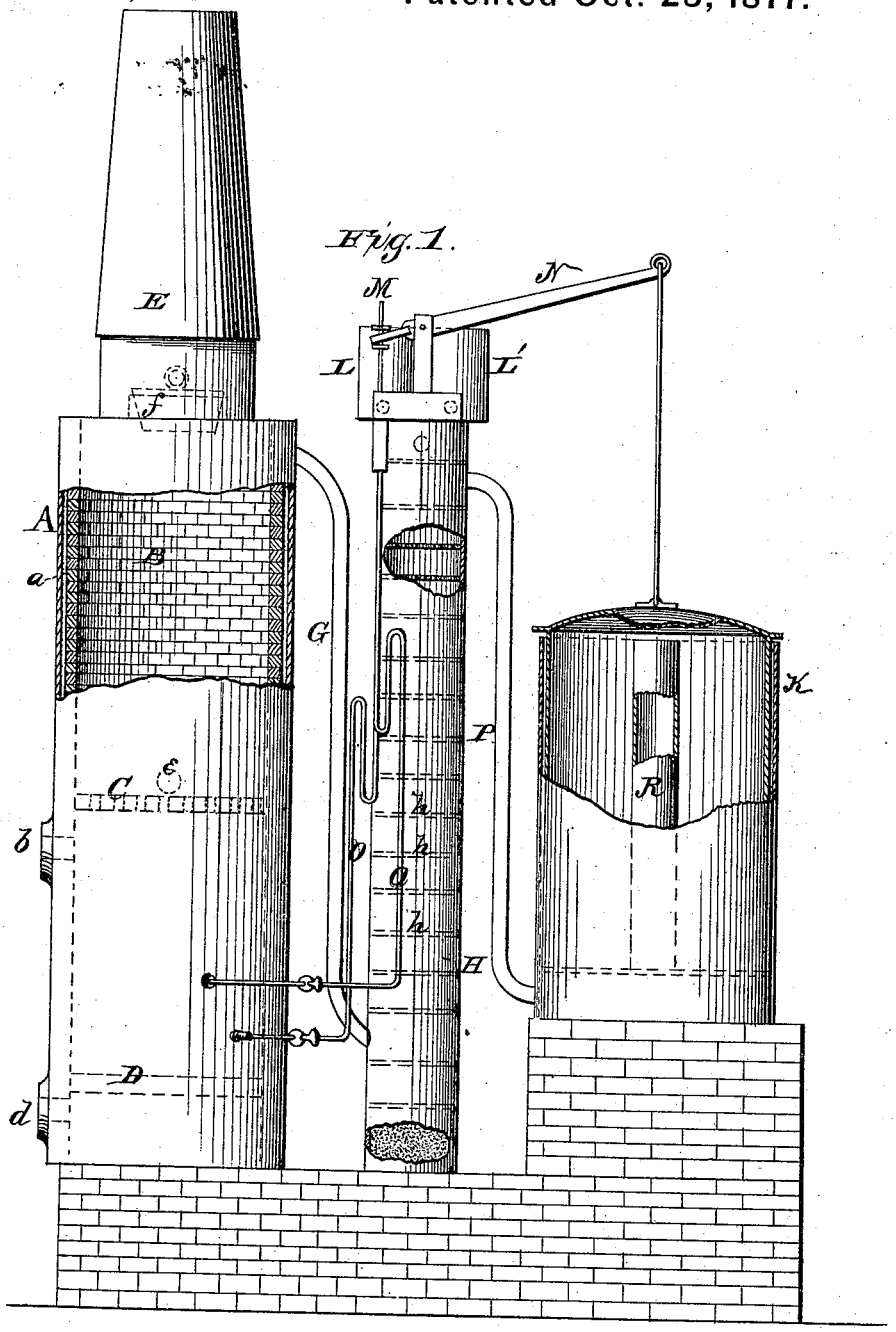


Fig. 2.

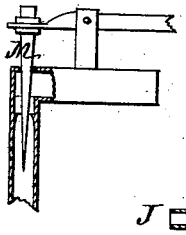
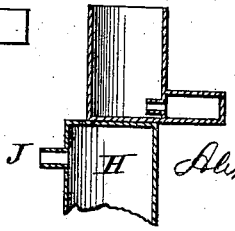


Fig. 3.



WITNESSES

Franck L. Durand

Frank Galt

INVENTOR

Theodore G. Springer

Alexander Mason

ATTORNEYS

UNITED STATES PATENT OFFICE.

THEODORE G. SPRINGER, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **196,495**, dated October 23, 1877; application filed August 2, 1877.

To all whom it may concern:

Be it known that I, THEO. G. SPRINGER, of Louisville, in the county of Jefferson and in the State of Kentucky, have invented certain new and useful Improvements in Process and Apparatus for the Manufacture of Gas; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the construction and arrangement of an automatic machine for producing a fixed gas from petroleum, or its products, and water; and, also, storing away in the day-time a sufficient amount of heat to generate what gas is consumed through the night, as will be hereinafter more fully set forth.

In the annexed drawing, Figure 1 is a side elevation, partly in section, of my machine. Figs. 2 and 3 are detail views of parts thereof.

In all the old processes the gas is generated during the day-time by keeping the retorts constantly at work, storing away the gas generated in a large gas-holder and consuming it at night, which requires a very large receiver to hold the gas, and this is very expensive, and requires a great deal of room.

In my process of storing away the heat in the day-time, and making the gas at night just as it is used, I do not require more than one-fifteenth part the room or one-twentieth part the expense in the construction of my works to make the same amount of gas as by the old process. Besides, I am enabled to put in works for a single block of buildings in a city, which would not be practical by the old process, on account of room and the smell attending the storing of the gas.

By my process I can construct works in each block in a city, and as I require no holder to store the gas in, and no main pipes larger than four inches, I am enabled to light a town for one-half the cost of laying mains by the old process.

The generator A is made of boiler-iron, tightly riveted together. The inside is lined with fire-bricks B, so arranged as to leave a dead-air space, *a*, of about three inches between the lining and the outside shell. This generator stands perpendicular, and has a perforated diaphragm, C, about the center, above which the generator is filled with some refractory porous substance. Directly below the division C is a door, *b*, tightly fitted to admit coal, and about fourteen inches above the lower end of the generator is a grate, D, to receive the coal. Below this grate is another door, *d*, fitted as above, which serves to give air in heating the generator, and to remove the ashes. A little above the division C is a pipe, *e*, as shown.

In the top of the generator is an opening, having a valve, *f*, and also a stack or pipe, E, which serves as a chimney to increase the draft. The stack or pipe E, when the machine is being operated, will be provided with a chain and pulleys, so as easily to raise or lower the same.

G is a pipe, which conducts the gas from the generator A B to the washer and cooler H, and should be provided with a stop-cock.

The washer and cooler H is provided with a series of perforated diaphragms or divisions, *h*, and at the lower end it is to be provided with a siphon-pipe, to allow the water to flow off without admitting any gas to follow.

The upper end of the cooler is provided with a pipe, J, to admit a flow of water regulated by a cock. This cock can be automatically operated by the rise and fall of the governor K, so as to admit of just the quantity of water necessary to cool the amount of gas being made.

On top of the cooler are two tanks, L and L′, to contain, respectively, water and naphtha or petroleum. These tanks are provided with a cock or device, M, operated by a lever, N, from the governor, for automatically discharging the exact quantity of petroleum or naphtha and water as is required to make the amount of gas being consumed.

O O are the pipes connecting the tanks with the generator, said pipes being provided with suitable stop-cocks. P is the pipe which carries the gas from the cooler to the governor. R is the connection from the governor to the pipes where the gas is to be consumed.

The machine being set up ready to operate, a fire is made in the lower part of the generator on the grate D, and, after being fairly

started, coal is put into the generator through the door *b*, filling the generator nearly up to said door, when the door is closed. When the coal becomes well heated and burning nicely, an air-blast is turned on through the pipe *e* into the lower part of the upper chamber of the generator, which ignites the products of combustion, and in a short time the generator is at a very high degree of heat, and is ready to make gas.

The generator being heated by internal combustion every foot of surface that is heated can be used to generate gas. When the proper degree of heat is attained the air blast is turned off, the lower door *d* closed, the stack raised, and the valve *f* fitted down gas-tight. Then, by opening the cocks in the pipes G and O O, the naphtha and water flow into the lower part of the generator, and are instantly converted into carbonic-oxide gas and carbureted hydrogen, and force their way through the pipe G into the washer H, passing up through the perforated divisions, meeting the water which is flowing into the washer, and the gas is thereby thoroughly washed and cooled. From the washer the gas is forced through the pipe P into the governor, which instantly begins to rise and operates on the device for admitting and closing off the water and naphtha, and only allows enough to enter the generator to supply the amount of lights being used.

Two generators may be used to one machine, if desired, in which case the generators can be much smaller, and one may be fired up while the other one is working off its heat.

The generator will be heavily covered with some non-conducting material to prevent the radiation of the heat.

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

1. The process of making a fixed illuminating-gas by feeding hydrocarbon liquid and water automatically, in proportion as the gas is consumed, into an incandescent body of coal in the combustion-chamber of the generator, and forcing the gas and vapors there generated through a heat-absorber, for making a fixed gas, as set forth.

2. In combination with a gas-holder and an automatic regulator, a gas-generator consisting of an exterior shell and interior lining, with air-space between them, and a perforated division or diaphragm inside the lining, forming a heat-absorber above and a combustion-chamber below the division, whereby the heat may be stored during the day-time, for use in the manufacture of illuminating-gas at night, in the proportion as such gas is being consumed, as set forth.

3. The generator consisting of the outer shell A, inner brick lining B, and space *a* between them, and provided with the doors *b d*, perforated diaphragm C, grate D, air-pipe *e*, valve *f*, and stack E, all substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of July, 1877.

THEODORE G. SPRINGER.

Witnesses:

FRANK GALT,

HENRY N. MILLER.