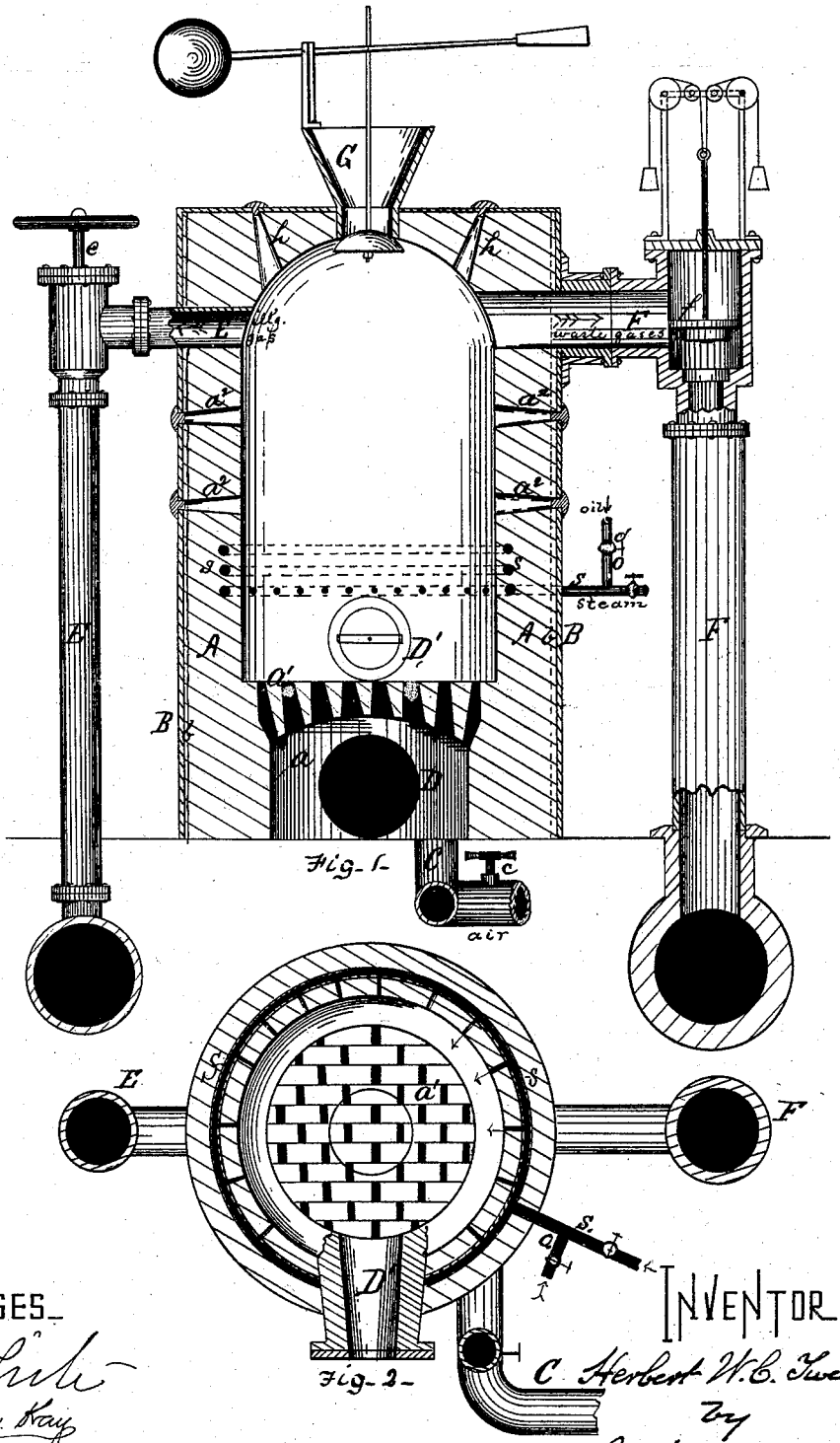
H. W. C. TWEDDLE.

Manufacture of Gas.

No. 165,189. Patented July 6, 1875.



WITNESSES.

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HERBERT W. C. TWEDDLE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **165,189**, dated July 6, 1875; application filed March 5, 1875.

To all whom it may concern:

Be it known that I, HERBERT W. C. TWEDDLE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Manufacture of Gas; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a view of apparatus which may be employed in carrying out my invention. Fig. 2 is a top view of the perforated or grated bottom of the vertical retort shown in Fig. 1.

Like letters refer to like parts wherever they occur.

My invention relates to the manufacture of illuminating-gas; and consists in superheating an admixture of hydrocarbon vapors and steam or aqueous vapors, and then passing the same through an incandescent mass of mixed carbonaceous and decomposing material contained within a closed chamber.

I will first describe the apparatus that may be employed, referring therefor to the accompanying drawing, and then specify the method of using the devices.

In the drawing, A indicates a vertical retort, of brick or other suitable refractory material, surrounded by an iron jacket or casing, B, between which and the brick-work is a small intermediate space, *b*, which may be filled with broken brick, or similar material commonly employed in filling in, where allowance is to be made for expansion and contraction in structures. The bottom of vertical chamber A is grated or reticulated to permit the upward passage of air from pit *a*, into which it is forced through pipe C. D D′ are doors or man-holes, one above and the other below the grated bottom or diaphragm a^1; and a^2 are a series of holes made through the walls of the retort for the introduction of a rod or poker to loosen up the contents of the retort when necessary. The holes a^2 are closed by a cap or other suitable means. Arranged within the brick-work is a steam-pipe, *s*, perforated at different points to admit steam to the interior of the retort, and connecting at one or more points with branch pipes *o*, which is used for introducing a hydrocarbon, so that steam and hydrocarbon may be forced into the vertical chamber at a point above the diaphragm. E is the exit-pipe for gas to be used for heating or illuminating, and F a similar pipe for conducting off waste gases, G being a bell or other closed hopper for filling the chamber with carbonaceous and other material. The several pipes C, E, F, and *o* are provided with suitable valves, as shown at *c*, *e*, *f*, and *o′*. *h h* are sight-holes for examining the state of the retort.

Having an apparatus of the class described, I proceed as follows: The valve in waste-pipe F being opened and that in E closed, a fire is started on the perforated or grated diaphragm and the chamber filled with carbonaceous matter, such as coke, charcoal, anthracite coal, or breeze, and a mixture of the same with cinder or slag containing carbonaceous matter and iron. The blast is admitted through pipe C, and the waste gases, carbonic acid, nitrogen, &c., conducted off by pipe F and utilized. As soon as the mass within the chamber has been raised to the desired temperature, the valves in pipe F and C are closed by shutting off the blast, the valve in pipe E, leading to the washers, exhaust-pump, and gasometer, is opened, and steam and hydrocarbons are admitted into pipe *s*, whence, after becoming admixed and superheated, they are discharged into the incandescent material contained in the retort, where decomposition and recomposition takes place.

The iron, by its presence with the carbonaceous material in the retort at the time the superheated admixture of steam and hydrocarbon is passed through, facilitates the decomposition and recomposition of the several gases and vapors, adding to the speed and certainty of the process. After this operation has been conducted for a time, the temperature of the mass in the retort will be reduced below the working point, and as soon as this is discovered the steam is shut off, the valve leading to the gasometer closed, and those in the blast and waste-gas pipe opened, which will soon bring up the contents of the retort to the required temperature, after which the several steps above described may be repeated. It may at times be advantageous to admit

steam for a short time after the air-blast has been cut off, and before the valve in the waste-gas pipe has been closed, so as to insure the freedom of the retort from waste gases before the valve leading to the gasometer is opened. During the working of the retort a slight vacuum is kept up by means of a pump or other means.

The gas produced as above may, subsequent to its production, be carbureted by passing it through or over gasoline or other light petroleum products. The gas, subsequent or prior to this, may be purified from sulphureted hydrogen by passing it through oxide of iron, and the carbonic-acid gas by washing through caustic soda or lime.

By this process one ton (two thousand two hundred and forty pounds) of hard coal or coke will produce about one hundred and fifty-five thousand feet of heating-gas; added to which two and a half to three gallons of gasoline of high quality will produce a gas of sixteen-candle power.

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

As an improvement in the manufacture of illuminating-gas, the process herein described, viz., superheating an admixture of hydrocarbon vapor and steam, and then passing the same through an incandescent mass of mixed carbonaceous and decomposing material contained within a closed chamber, substantially as specified.

In testimony whereof I, the said HERBERT W. C. TWEDDLE, have hereunto set my hand.

HERBERT W. C. TWEDDLE.

Witnesses:

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T. B. KERR.