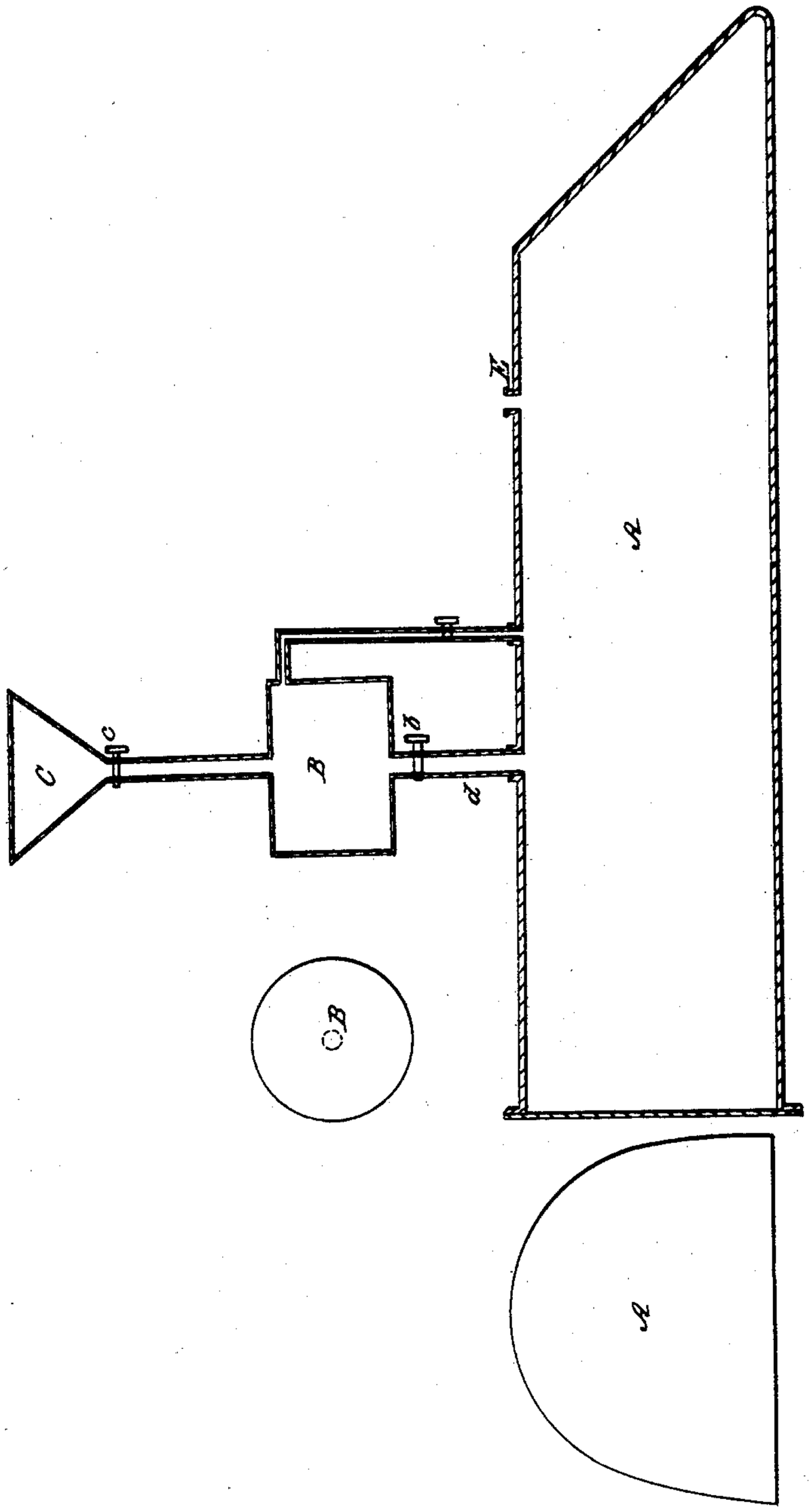
J. W. SMITH.

Manufacture of Coal Gas for Illumination.

No. 45,460. Patented Dec. 13, 1864.



Witnesses:
C. G. Allen.
P. G. Gale.

Inventor:
J. W. Smith
for his attorney
P. D. Gale

UNITED STATES PATENT OFFICE.

JOHN W. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO HIMSELF AND JONAS GREENE, OF SAME PLACE.

IMPROVEMENT IN THE MANUFACTURE OF COAL-GAS FOR ILLUMINATION.

Specification forming part of Letters Patent No. **45,460,** dated December 13, 1864; antedated October 17, 1863.

To all whom it may concern:

Be it known that I, JOHN W. SMITH, of the city of Washington, D. C., have invented certain new and useful Improvements in the Manufacture of Illuminating-Gas; and I hereby declare that the following is a clear and sufficient description thereof, reference being had to the accompanying drawings and references marked thereon, which make part of the specification.

In the drawings, A represents a D-form retort for coal-gas. B is a reservoir for gas-tar for second feeding; C, funnel for supplying the reservoir. D is an air-pipe for air from inside of the retort to aid in discharging reservoir into the retort. E is pipe for discharging gas from the retort. F is the feed portion of the retort. *a* is a stop-cock for the air-pipe; *b*, a stop-cock between the feed-reservoir and the retort; *c*, a stop cock for the controlling of the feed-funnel C; *d*, pipe for letting tar into retort.

The invention consists in a mode of arranging and conducting the feed of a coal-gas retort, so as to compensate for the diminution of the carbon in the gas generated toward or during the latter half of the time the charge of coal is under heat, by means of feeding in the gas-tar generated during the first half of the heating time. The average time of heating the coal is four hours for the charge, and my time for feeding the gas-tar is at the end of the first two hours, or at the middle of the operation. Nor is this point in the process taken at random, but it is selected as the time when the richest part of the illuminating-gas has come over, and when the light carbureted hydrogen is beginning to predominate, and something is wanting at this stage of the process to supply a gas that contains more carbon than what is derived directly from the coal. I therefore select the middle of the process for beginning the liquid feed and keep up this feed to the end of the fourth hour or near it, when the retort is to be charged afresh with coal. Nor is it a matter of indifference as to what gas-tar is used.

The latter part of the process yields products that have an excess of carbon, it is true, but requires too high a heat to vaporize them to render them available as feed for the retort. This class of compounds embraces the chrysen, pyren, naphthalin, paranaphthalin, but what is needed to be fed as coal-tar is the products of the first part of the distillation—namely, the light oils and the naphtha liquid and such as come over up to the end of the second hour. These materials contain an abundance of hydrogen and readily yield it in the presence of the half-exhausted bituminous coal and serve to improve the quality and quantity of the gas from a given weight of coal.

I am fully aware that it is not a new device to use gas-tar for a gas feed, either in whole or in part, nor do I claim the use of gas-tar for making gas, but what I regard as the invention is the process or method of feeding in gas-tar into coal-retorts, commencing in the middle of the process of heating and continuing the feed to the end of the process.

Operation: The retort A, being one of the D-shaped retorts, such as are now generally used in making gas from coal, is charged with the usual amount of coal, and when the heat has been on two hours, B having been previously charged with the amount of gas-tar made the last two hours, is now discharged slowly through pipe *d*, controlled by the stop-cock *b* (stop-cock *c* having been first closed) and stop-cock *a*, opened at the same time. The pressure from the inside of the retort communicates through pipe D into the upper part of reservoir B and forces the gas-tar down into the retort A, supplying all the feed necessary, which has to be controlled by the stop cock *b*, in accordance with the attendant circumstances. The operator must know how fast the pipe *d* will feed when under pressure of the inside of the retort by preliminary trials.

Having now described the process for making coal gas by a mode of feeding from a reservoir of the liquid products produced in the first half of the process, what I claim as my invention, and desire to secure by Letters Patent, is—

Making coal-gas by charging the retort with coal and heating in the usual way for two hours, and at the end of this time supplying the gas-tar thus far made in the operation through reservoir B, substantially in the manner and for the purpose set forth.

JOHN W. SMITH.

Witnesses:

L. D. GALE,

C. G. ALLEN.