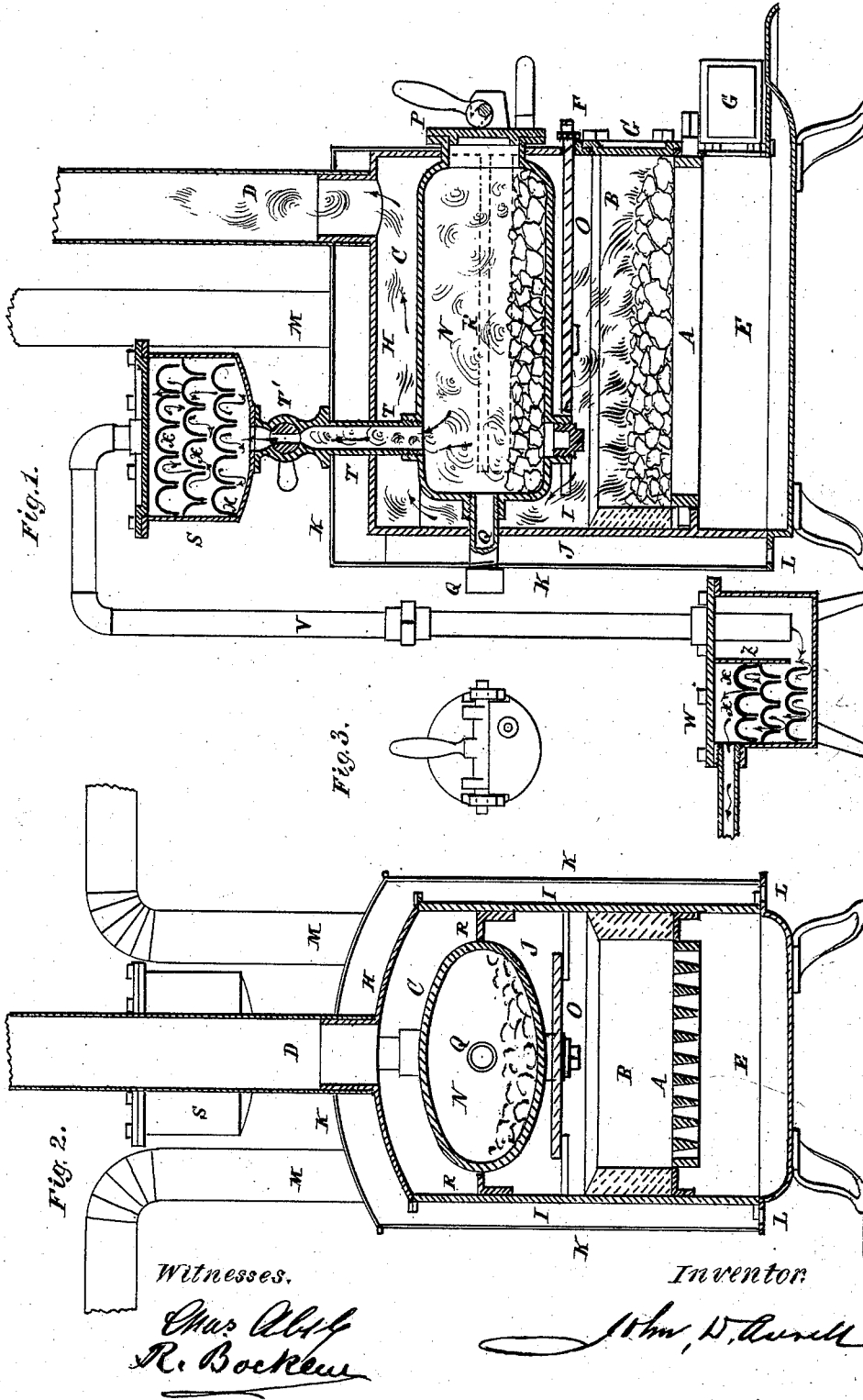


J. D. AVERELL.  
 COAL-GAS PURIFYING APPARATUS.

No. 194,636.

Patented Aug. 28, 1877.



# UNITED STATES PATENT OFFICE.

JOHN D. AVERELL, OF NEW YORK, N. Y.

## IMPROVEMENT IN COAL-GAS-PURIFYING APPARATUS.

Specification forming part of Letters Patent No. **194,636**, dated August 28, 1877; application filed January 25, 1877.

*To all whom it may concern:*

Be it known that I, JOHN D. AVERELL, of the city, county, and State of New York, have invented certain new and useful Improvements in Coal-Gas-Purifying Apparatus, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The class of gas generating and purifying apparatuses herein referred to relates to the combined generator and purifier of gas with a stove or heater for heating buildings and other localities.

I am aware that an apparatus similar to that hereinafter described is old for generating gas; and this invention relates to the apparatus and devices used for purifying gas.

In the annexed drawings, Figure 1 represents a longitudinal vertical section of the apparatus with my improvements. Fig. 2 is a cross-section of the same, taken through the chimney of the same. Fig. 3 is a face view of the cover or cap of the retort.

A represents the grate of the fire-chamber, B of the stove or heater. C represents the heating-chamber, and D the smoke-stack or chimney of the same. Under the grate is arranged the ash-pit E. Said ash-pit and fire-chamber are furnished on the front side F of the stove with proper doors G. H is the top, I I the sides, and J the back, of the stove. K represents a sheet-metal casing or air-jacket, which covers the back, sides, and top of the stove, with an air-space between them to accumulate the heated air, which enters at the bottom of said jacket through the openings L L, and passes toward the top H between the back and sides of the stove and the casing K, and thereby becomes heated. From the top of the casing said air is conducted, through the pipes M M, into the departments of the building to be heated. The fire-chamber B is lined with fire-bricks or other material suitable for the purpose.

In the heating-chamber over the fire is employed a horizontal gas-retort, N, arranged centrally between the sides of the fire-chamber or heater. Said retort is of oval form, with its largest diameter arranged horizontally, to have its top and bottom present a large surface for heating and to spread the coal in

the retort more flat. Between the retort-bottom and the grate and fire is arranged a soap-stone plate, O, in horizontal position. Said plate is made to slide in or out from said chamber through the front of the heater. It is to be used whenever the generating of gas is desired to be retarded or stopped, or in case the fire becomes unduly intense by a draft too strong, and in order to protect the bottom of the retort. For rapid generation of gas the said plate may be withdrawn entirely.

Said retort may be made of equal dimension its whole length; but I prefer to shape its forward end with a round neck, which has a flange for a joint, with the cap P to close its mouth, after being charged air-tight, either by the use of proper packing, of cement or clay, or having said joint ground and fitted.

Said mouth of the retort may have lugs, as shown, to apply a cross-bar in front of the cap for properly locking the cap to the mouth.

The rear end of the retort terminates with a short tube, Q, which extends through the back of the heater and the casing. By this means said rear end is properly supported, and over the end of the tube Q is applied a properly-tight cap.

On each side of the heater, along the sides of the retort nearest, is secured or cast a partition-plate, R, so that by them, with the bottom of the retort, the fire-chamber and heating-chamber are divided on their greater part; but near the rear of the retort said partition-plates terminate and allow a communication between said chambers.

The retort terminates on the rear a short distance from the back of the heater, so that the fire can pass up between the back of the heater and retort, the chimney D being arranged on the forward part of the heater. By this means the draft, after passing under the bottom and over the rear, passes over the top of the retort to the chimney, thereby applying the most intense heat to the coal charged in the retort, and the less intense heat to superheat the vapors, which application is most economical and effectual for generation of gas.

T represents the discharge-pipe of the retort, through which the vapors pass into the tar-condenser or purifying-receiver S, arranged

above the heater or stove, and, after passing through said receiver, they are conducted off through the pipe V into a secondary receiver, W, arranged at a lower position, and from said secondary receiver said vapors may either pass directly into the gas-holder or may still pass through succeeding purifying receivers before entering the holder.

The retort is provided with a neck on the top as well as on the bottom, to attach the pipe T, in order that, after the bottom side of the same becomes clinkered and burned, said bottom side may be turned to the top and said pipe attached to it in the reversed position. The neck on the bottom is always closed, with a plug fitted thereto.

The receiver S is provided with several tiers of small inverted sheet-metal troughs, *x*, which are arranged and suspended in the same direction horizontally above one another, but in an order to break joints, so that the vapors are received up into them, but are obliged to turn down out of them to pass their junctions. From there they are again directed to pass up into the hollow portions of the succeeding tier of troughs *x*, and so on from tier to tier, whereby a most effective friction is offered to said vapors, causing a rapid condensation of the tar and the purifying of the gas.

The condensed tar passes down to the pipe T, and is by it conducted back into the re-

tort, where, by the intense heat, the said tar is again vaporized, so that by this means a large amount of gas is gained from the tar.

The secondary receiver W is furnished also with the similar sheet-metal troughs *x*, which may be in this receiver arranged vertically; but I prefer to have them also horizontal, to cause greater friction of the vapors. Said receiver has a vertical partition, Z, from the top to within a short distance of the bottom, to cause the vapors to pass the lower row of troughs.

The receivers S may be furnished with a safety-valve, to provide means of detecting any clogging in the receivers or connected pipes, and the exhaust of said safety-valve may be connected with the chimney to allow the escape of the vapors, and thereby avoid explosion or fire.

What I claim as my invention is—

The combination of the inverted troughs *x* in tiers arranged within the condensers S and W, substantially as and for the purpose of purifying gas, as herein set forth.

In witness whereof I hereunto set my hand this 20th day of January, 1877.

JOHN D. AVERELL.

In presence of—  
R. BOEKLEN,  
CHAS. ABEL.